GOOD HEALTH:

1871.

A POPULAR ANNUAL

ON THE

LAWS OF CORRECT LIVING,

AS DEVELOPED BY

MEDICAL SCIENCE,

ETC.

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GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Second Paper.

EXERCISE.

ONE great distinguishing mark between animals and plants is voluntary motion: all animal organisms are created for motion; not necessarily locomotion, but motion of some kind. All young animals are filled with an instinctive love of motion, by which their fluids are actively circulated, and their growing bodies fully developed; the young human being is the only animal organism in which this natural tendency is repressed. The effects of muscular action are seen in the development of various parts of the body: the arm of the blacksmith, the legs of the dancer, the neck of the porter, are familiar examples of growth of particular regions of the body by exercise. The muscles not only move the limbs, but they keep the body upright, balancing it evenly on the extremities; hence we may understand how unnatural positions, — as standing on one leg, sitting upon one foot, leaning upon one arm, bending the chest forward or sideways,—may cause deformity about the hips, shoulders, spine, and limbs, especially if practised during youth, when the bones and ligaments are yielding. Many such deformities, lasting for life, owe their origin to the school-room.

The late Dr. John C. Warren writes: "Of the well-educated females within my sphere of experience, at least one-half are affected with some degree of distortion of the spine." An eminent French writer says: "It is so common that, out of twenty young girls who have attained the age of 15 years, there are not two who do not present very manifest traces of it." Any one who will walk along Beacon Street, or other places where young ladies congregate, will soon be convinced of the truth of the above statements, by simply trying to find one of the fair pedestrians who has not one shoulder higher than the other. The remedy lies in impressing teachers, and especially mothers, with the importance of the rudiments of physiology and hygiene; the teaching and the practice belong essentially to the economy of the household, not of the school-room.

The spine is not a mere contrivance to keep the body erect, like a kind of internal walking-stick, which will answer the purpose just as well if it be a little crooked; the spine encloses the central spinal marrow, from which come off most of the nerves of sensation and motion, and of those essential to the performance of respiration, circulation, and digestion; all these functions will be disturbed in proportion to the degree of pressure arising from its curvature; the lungs and heart are to the same extent displaced, constituting additional sources of disease.

Corsets.

Among the causes which prevent muscular exercise, the compression of the chest by corsets is one of the most

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remarkable. Where on the earth, or under the earth, or in the waters, or in the air, in things animate or inaminate, this fashion found its original model, unless it be in the venomous wasp, it would be hard to discover. Tradition insists that corsets were invented by a butcher of the 13th century, as a punishment for his wife. Finding nothing to stop her loquacity, he put a pair of stays on her to take away her breath, and so prevent her from going about and talking. This effectual punishment was inflicted by other cruel husbands, till at last there was scarcely a wife in all London who was not tied up in this manner. The punishment became so universal at last, that the ladies, in their defence, made a fashion of it, and so it has continued to the present time. The form given by corsets to the female chest is directly opposed to Grecian and Roman models of beauty; no representations of the ancient goddesses, of the Muses, of the Graces, of the Nymphs, unless it be the mail-clad Minerva, would give the least idea that they wore corsets. Bonnets change in their size and shape from a coal-scuttle to a lamp-mat, and in position from the back of the head to the forehead; sleeves oscillate between the leg-of-mutton and the broomstick form; skirts vary from the flowing folds of the Roman matron to the hogshead size and steel stiffness of the last year; but the corset remains firm and unchangeable, except in material, through all the other caprices of fashion,—so universally worn that a lady scarcely considers herself well dressed without it; and so desirable, that its first application is an epoch in the life of a miss, looked forward to with the same longing expectation as is the first pair of pantaloons by her younger brother. Its use must be classed with those other caprices of fashion, which make obesity a charm to the Eastern nations, a flattened forehead beautiful in the eyes of a Northwest Indian, a stick through the nose ornamental to the Australian, or useless and small feet desirable to the women of China. They are all strange and inexplicable examples of the human imagination; but as the flattened forehead may make a fool, as the perforated nose or lip obstructs articulation, and as the small feet hinder walking, so the compressed chest impedes free respiration, renders difficult the heart's action, and thus prevents the natural exercise necessary for the proper elaboration, circulation, and aëration of the blood.

What else could be expected from a compression tighter than the surgeon would dare to employ to keep the chest motionless in the case of a fractured rib?

It is not denied that corsets may, in some cases of weakness and distortion, furnish a valuable, perhaps necessary, support to the chest; they are alluded to here as a piece of fashionable dress, and as such pronounced a most absurd, injurious, and death-hastening contrivance,—in the sense in which the accumulated horrors of female fashions are graphically described in the following extracts from a well-known poem of Dr. O. W. Holmes:

"My aunt! my dear unmarried aunt!
Long years have o'er her flown;
Yet still she strains the aching clasp
That binds her virgin zone;
I know it hurts her,—though she looks
As cheerful as she can;
Her waist is ampler than her life,
For life is but a span."
* * *
"They braced my aunt against a board,
To make her straight and tall;
They laced her up, they starved her down,
To make her light and small;
They pinched her feet, they singed her hair,
They screwed it up with pins;—
O, never mortal suffered more
In penance for her sins."

The hoops which have recently become so important an article of dress, can hardly be considered as health-destroying articles, unless in very cold and windy weather; and when not of extraordinary size and weight, tend rather to favor than to obstruct the free motion of the limbs, which it is the aim of healthful exercise to secure. They surely are a great improvement over the custom that preceded them: viz., of wearing 10 to 15lbs. of skirts suspended from the hips. The continual dragging and pressing of such a weight upon the soft and yielding organs of the abdomen, caused numerous infirmities and displacements unknown in young

people in old times, when these articles of female apparel were attached to waists, and directly or indirectly suspended from the shoulders. The suspension of such weights from the hips is even more injurious than the use of corsets. The proper dress for the female is a thing yet to be discovered, — one that shall allow the free use of every limb, impeding the natural growth of no organ, disturbing no vital function; at the same time graceful, and acceptable to maiden modesty, matronly dignity, and the quiet repose of age and infirmity.

Various Kinds of Exercise.

Remove, then, all unnatural restraint, and allow the limbs free scope for active exercise, which is so important that it has come to be regarded as synonymous with physical education, though it is really but a part of it. Nature, if untrammelled, is sufficient for the physical development of the body; it is our artificial and luxurious state of civilization that opposes the natural tendency to active exercise; and in order to regain the lost advantages, we must return to first principles. Habits of bodily exercise should begin very early in life; fresh air, every day and at all seasons, is less dangerous to the healthy infant than are accidental and occasional exposures to delicate children. As regards the sports of children, there is much truth in the following extract from an old paper: "We like mischievous children, and for this reason: they are apt to make *old* men. *Good* boys generally die in their fifth year; not because they are *good*, but their quiet habits make them strangers to mud-puddles, oxygen, dirt-pies, and out-door exercise." While playing out of doors, the child should be properly and warmly clothed, to insure and keep up health; no bare legs, and arms, and chest, in winter and spring, under the absurd pretence of hardening the child, should be permitted; and flannel should be worn next the skin in our cold and changeable climate, for at least half of the year. If proper food, as the capacity of the stomach for the digestion of more and more solid substances increases, be added to the warm clothing, fresh air, and exercise, the doctors' bills would be very much lessened, and a large number of voters added annually to the country.

Leaving, then, out of the question the preventives of deformity in children, let us consider exercise in its relations to the adult man and woman.

Walking is, beyond dispute, the best possible exercise, as it brings into play, in rapid succession, all the sets of muscles of the trunk and limbs. Says Jefferson: "The Europeans value themselves on having subdued the horse to the use of man; but I doubt whether we have not lost more than we have gained by the use of this animal. No one thing has occasioned so much degeneracy of the human body. An Indian goes on foot nearly as far in a day, for a long journey, as an enfeebled white does on his horse, and he will tire the best horses."

The next best exercise for the female is dancing; this brings into action a great part of the muscles, — indeed all except those of the arms. The benefit of dancing is counteracted in balls and crowded assemblies by the impure air, mental excitement, eating and drinking, and unavoidable exposures; but at home there is no pastime more becoming the domestic circle, more beneficial, or more innocent.

A lady once consulted the eccentric John Abernethy respecting a nervous disorder, the particulars of which appeared to him so whimsical, that he interrupted the tedious details by holding out his hand for the fee. A one-pound note and a shilling were placed in it; he returned the shilling to the lady, with the exclamation, "There, ma'am! go and buy a skipping-rope — that is all you want." And many a young woman in America may profit by his advice.

Sydenham, an English physician, had such confidence in exercise on horseback, that, in one of his medical works, he says, "If any man was possessed of a remedy that would do equal service to the human constitution with riding gently on horseback, twice a day,

he would be in possession of the philosopher's stone."

There can be no doubt that many cases of obscure nervous diseases, dyspepsias, gout, and neuralgia, require for their relief nothing more than a regulated diet and active exercise; and that the reply of Mr. Abernethy to an indolent and luxurious citizen, who asked what was the cure for gout, contains the simple and whole truth for the cure of the diseases of indulgence and laziness: viz, "Live on sixpence a day, sir, and earn it."

The Gymnasium.

In imitation of ancient and modern Europe, attempts were long ago made in this country to form a gymnasium on a large scale; through the exertion of Dr. J. C. Warren and others, Dr. Lieber, of Germany, opened a very successful one in Boston about fifty years ago; since then they have been opened in all the large cities of the country, and colleges and academies now regard them as a necessary portion of the educational apparatus for both sexes. Invaluable as they are to persons of sedentary habits, who have neither the time nor inclination to walk two or three hours daily simply for exercise, they are not even now properly appreciated by our men of business and letters, and especially by those who manage our educational facilities.

The late Daniel Webster, whose passion for manly and out-door sports is well known, many years ago wrote a letter on this subject, from which the following are extracts: "I am highly pleased with the idea of a gymnasium. Those who have the charge of education seem sometimes to forget the body is a part of a man. The number of young men who leave our colleges, emulous indeed, and learned, but with pale faces and narrow chests, is truly alarming. If it be desirable that there should be cultivated intellect, it is equally so, as far as this world is concerned, that there should be also a sound body to hold it in." In a speech made by Edward Everett, at a festival in commemoration of the birthday of Webster, the following true remarks occur: "From morning to night—from January to December—brain and hands, eyes and fingers, the powers of the body, and the powers of the mind, are in spasmodic, merciless activity. There is no lack of a few tasteless and soulless dissipations which are called amusements, but noble athletic sports, manly out-door exercises, are too little cultivated in town or country."

The gymnasium ought to form a part of every college and institution of learning, and its exercises should constitute a regular portion of the course of instruction. It would be well if the most *active* member of a class had his college honors as well as the first *scholar*; the former would be likely to make a vigorous and useful member of society; the latter is apt to degenerate into a second-rate man or a useless invalid. Follow the careers of most of the first scholars of our colleges, and see how few maintain, in after life, the supremacy they gained as students; in the struggle for life the strong arm is as necessary as the active brain. What Cicero and Cæsar, according to Plutarch, found time to do in the midst of the stirring events of ancient Rome, surely young students and merchants can find time to do at the present day.

As gymnastic exercises are so powerful for good when properly directed, they are as powerful for evil if injudiciously performed. Physical education, like the practice of medicine, should not be in the hands of empirics, ignorant of the structure, and functions, and capabilities of the human body in its various constitutions; but it should have its learned professors, anatomists, and physiologists, and physicians, and be elevated to the rank of intellectual and moral discipline.

Exercise, then, by increasing muscular action, quickens the circulation of the blood, introduces more air into the lungs for its purification, facilitates all the processes of nutrition and secretion, creates a demand for food to supply the waste of tissue, and provides for the healthy performance of every animal and organic function.

PUBLIC HEALTH.

MAN'S health, as an individual, has been well defined as "the greatest energy of each part compatible with the energy of the whole," and this state is continued only by obedience to certain conditions. The relations of the human body to the air which surrounds it, to heat and cold, to the food it absorbs, to the poisons in or around it, must be observed, or ill-health is the result. Instinct and experience have done much towards framing a code of personal hygiene: they have taught the savage to protect himself from cold, to select the nutritious from the poisonous fruit; but as social life becomes developed, instinct and experience prove all but powerless in the absence of a further knowledge of nature's laws. If a man builds a house, he is at once involved in the difficult problems of ventilation, heating, and drainage; as food becomes more plentiful and varied, questions arise as to the wholesome and the unwholesome; with the growth of wealth and luxury come new wants, fresh complications, and diseases unknown in the primitive state. When man becomes a member of a community; when the increase of population, the exigencies of trade and other causes lead to the formation of villages and towns; when densely packed masses of human beings have bartered their birthright of pure air and the crystal spring for the atmosphere of a crowded street and water drawn from a filthy well; when the mine and the workshop and the giant manufactory are peopled with living beings, and ships are sailing every sea, —problems arise which are unknown to the individual or the family—problems which are amongst the most difficult, as they are amongst the most important, which can fall to man to consider.

CLIMATE.—Every portion of the globe possesses certain physical conditions, such as configuration of country, geological structure, altitude or depression, vegetation, sea or river, which, acting on and modifying the imponderable forces of nature, give rise to what we term climate. The moisture in the air, the prevailing winds, the amount of sunshine or of rain, of heat and cold, are influenced and controlled by the natural features and geologic structure of the soil. What may be the action of these agents, apart from other conditions, on health, what part they take in the peculiarities of constitution and of race, is not so easily defined. "Man," says M. Boudin, "is in more respects than one the mere expression of the soil on which he lives," and this extreme estimate of the moulding force of external nature has been ably advocated in one of Mr. Buckle's most engaging chapters; but, without attempting to assign any precise value to this or that modifying force, the real influence of climate on the health and development of man cannot be doubted. The wise physician pictured by Hippocrates is "he who has a due regard for the seasons of the year and the changes which they are observed to produce, to the states of the wind peculiar to each country, and to the quality of its waters; who marks carefully the locality of towns and of the surrounding country, whether they are low or high, hot or cold, wet or dry,"—and the advice of the great sanitarian was the result of a profound knowledge of nature's laws.

No estimate of a people's health can be complete which ignores the atmospheric and telluric conditions under which they live, yet how few and fragmentary are the records from which any reliable conclusions can be drawn. A medico-meteorological map of the country is an impossibility at the present time, and so little is known with certainty of the combined effect of any given climatic conditions, that the vegetation, in the absence of personal experience, will be found a more trustworthy guide to the character of a climate than any data obtained from instrumental or artificial sources.

The medical man is constantly reminded of the influence of weather in the persons of his patients, those accurate "body-ometers," as Sir Humphrey Davy used to call them, yet he is un-

able to pronounce with certainty whether the effect is due to reduced barometric pressure, excess of ozone, preponderance of positive or negative electricity, increased or diminished humidity. The epidemic condition of seasons is a fact even now but ill understood, and the terms relaxing and bracing, loosely used to denote the moisture or dryness of the air, are probably the expression of more factors than one. It is only by accurate local observation, spread over long periods, that the relations of climatic changes to disease can be fully ascertained.

AIR. — Intimately connected with climate is the air we breathe. Fresh air is a necessity of life, a first condition of health; but city air is no longer the purifying, life-giving body which is met with on the sea-shore or the mountain top. Its ozone is exhausted, it is laden with poisons from multitudinous chimneys, and a dense crowd of organic impurities are revealed by the microscope or the transient sunbeam. In the courts and alleys it does not improve; it is worse still in the workshop or the crowded house, where ventilation is ignored and the laws of cubic space unknown.

WATER. — Next in importance to air, and equally with it a necessity of life and a condition of health, is water. Pure air and pure water are man's right, and no change of place should make them inaccessible. Not only a wholesome supply for drinking, but baths and wash-houses should in every town be within the reach of the very poor. Dirt and disease are inseparable, and it should be a lasting disgrace to the community that renders both inevitable by a water supply which is either impure or insufficient for the wants of the population.

The source of water supply is perhaps the most momentous problem which a town's population can have to solve, and it has acquired still greater importance from recent investigations respecting the spread of disease; yet not only the source, but the quantity, distribution, and even quality of the water, are not unfrequently in the hands of those whose interests are not those of the consumers. A trading monopoly may decimate by cholera and diarrhœa, may degrade in filth and depravity, the poor of a town, which in cruel mockery they are said to serve. On the subject of purity much difference of opinion still unhappily exists. What amount of impurity, what amount af animal pollution, if any, can be consumed with safety? Does filtration, does exposure to air in the river's course, convert a sewage-laden water into a wholesome drink? are questions still seething in the crucibles of rival chemists, — questions which it may yet be that the physiologist will be called upon to decide. Low levels will receive the drainage from higher parts and of streets as well. Sewers will leak or get blocked, old cesspools are never in repair, yet pumps are still used in the densest quarters of our towns and cities, and, as might be expected, are the fruitful source of typhoid and choleraic disease.

SEWAGE. — "Is industry free to tumble out whatever horror of refuse it may have arrived at into the nearest crystal brook, regardless of gods and men, and little fishes; is free industry free to convert all our rivers into sewers?" exclaims a modern writer, and with reason; but an indignant protest is one thing, and a practical remedy for the evils declaimed against another.

"It is ours to use air and water," says Dr. Gairdner, "and then to pass them on; but woe to the man or the community that detains or imprisons these, his servants of the hour, in their further execution of God's endless work." The danger is now too well known to be commented upon, and it is not going too far to say that the disposal of sewage is one of the great sanitary questions of the day. River pollution has assumed gigantic proportions; yet the difficulties — sanitary, engineering and agricultural — in the way of change are appalling; so great indeed that they have led thinking men to go back once more to the first rudiments of sanitary science, there, haply, to find wisdom and the right way. No single system, however, can be expected to accommodate itself to the outfall, the soil, and the topographical as well as

social conditions of each several centre of population.

DRAINAGE.—Drainage, though closely allied to sewage, has its very distinct purposes in the economy of health; and though the latter may be the most pressing, the former is equally important in the removal of unsanitary conditions.

The drainage of a town, however, may be complete, and yet, if the house drains are untrapped or out of repair, the results are no less disastrous.

Indeed the more perfect, and the more impervious are the sewers, the greater the danger from the admission of typhoid and other poisons to our dwellings through every unguarded avenue in the drains which communicate with them. The facts bearing on this subject are innumerable, and a small pamphlet by Dr. Carpenter, of Croydon, England, called "Hints on House Drainage," may be mentioned as giving in the smallest compass such information on the subject as every householder should possess and ponder, if he values the health of his family and those under his roof.

The stench from a tallow factory or other offensive trade may pervade whole districts of a town, and sicken all within its reach. Pigsties may exist in back courts and alleys, may poison wells with impunity, and be the bane of a whole neighborhood. Slaughter-houses may remain in the very centre of the cleanest (?) towns, unnoticed, perhaps, but none the less dangerous; and yet if no actual case of acute disease can be attributed to them, if not offensive to the eyes or nose of the inspector (appointed most frequently without other qualification than that of being right in politics), they are no nuisance in the eye of the law, and may continue unchecked in their silent work of sapping at their very foundations the health and strength of the people.

FOOD.—The direct connection of drunkenness with insufficient food is now an acknowledged fact, but it is one cause amongst many; the adulterations of beer and spirits, according to the inexorable laws of "competition in business" by which thirst is stimulated, but never quenched—and the tainted water supply which drives the working man from his home to the nearest public-house, are no less potent in the causation of intemperance and its train of disease.

The adulterations of food are possibly less directly hurtful to health, and injure the morality of the seller only; but it would be difficult to estimate the influence on infant mortality of bread loaded with alum, milk from a diseased source, or diluted with water. In like manner it is hard to say what may be the direct ill consequences following the consumption of meat in any way tainted.

The question is a vital one for the poor, and if the cheap joint is to be driven from the market, it must be by providing a substitute as cheap, and less hazardous to health and life. The problem thus connects itself with all the various attempts which have been made, with varying success, to prepare food at little cost, which shall be wholesome, nutritious, and not unattractive in appearance, taste, or smell.

Turning to medicine, adulteration meets us even here; and the most stringent regulations, followed up by vigilant inspection, will be required if this the physician's sheet-anchor in disease, is to do its part in the reduction of mortality, and in the improvement of Public Health. The sale of poisons in the guise of quack remedies bearing the Government stamp should be checked, and the substitution of a lotion for an innocent drug, with all its distressing consequences, should be rendered impossible by the compulsory adoption of bottles unmistakable, even in the dark, from a marked peculiarity of form.

OCCUPATION.—Under the head of Occupation, I would include the kindred subjects of work, rest and recreation. Perhaps there is no portion of sanitary legislation which has been so partial in its aim, so unsatisfactory in its results, as that which deals with the protection of workers in trades injurious to health. The reports to the English Government on excessive lung

disease and its connection with the occupation of the people, by Dr. Greenhow, in 1860 and 1861; of Dr. Guy, on industrial diseases connected with arsenic; of Dr. Bristowe, on those connected with phosphorous, in 1862; on lead and mercurial poisoning, by Dr. Whitley, in 1863; of printers and tailors, by Dr. E. Smith, in the same year; and others too numerous to mention,— all tell the same sad tale of lives crippled or prematurely ended in the great struggle of modern civilization.

But not only are many trades unhealthy in themselves, — the hours of work are often far beyond human endurance; and the protection afforded to minors should, in all reason, be extended to adults. Trades Unions, with all their faults, have done good service where they have protested with all their strength against a reckless extension of work time, and the curtailment of needful rest. Many hopeful movements have originated among the trade classes themselves, such as the early closing of shops and the Saturday half-holiday; but they are far from being universally adopted, and a radical remedy has still to be sought for an all-pervading evil. Turning to recreation, we seem to have travelled far indeed from the time when

"Toil remitting, lent its turn to play."

Would that it could be recalled with all its boisterous mirth! We do, here and there, meet with an athletic Christian pastor doing battle with vice and immorality, by leading the thoughtless ones of his flock to cricket on the village green. Working men's clubs with their lectures and evening classes; libraries, both public and private; with a host of entertainments, elevating and the reverse, invite the studious or social when their day of toil is over; but for the masses in our towns and cities, the aimless Sunday walk, or the cheap excursion, is often the one healthy recreation of their lives. Whilst athleticism has run riot amongst our middle classes, its very rudiments remain to be taught in the lower strata of our town and city populations; and much indeed must be added if we are to restore to the over-tasked thousands that heart and hope which alone can redeem them from pauperism and the depths of despair.

Disease. — In treating of disease, I shall confine my attention to those types which may be almost certainly prevented or controlled by proper sanitary arrangements — the so-called test diseases of a people's health.

The connection of cholera and diarrhœa, with impure water supply as their most frequent source, is at length based on facts too numerous and too stubborn to be denied. The origin of typhoid in sewer gas and foul emanations, of typhus in over-crowding and destitution, is now questioned by a very small minority of those competent to judge. Phthisis has been traced to its home in over-heated, ill-ventilated workshops, and undrained tracts of country.

The disorders of children are now known to be modified by the sanitary surroundings of those they attack; yet how complete is the ignorance of local health authorities of the prevalence or intensity, not only of ordinary disease, but of epidemics even at their very doors. The annual returns of mortality are, with few exceptions, their first intimation of the havoc which scarlatina, typhoid, or small-pox may have caused amongst the people they are sworn to protect. Early intimation of disease, and especially of preventable disease, is the very corner stone of all real and effective sanitary organization; and this leads me to say a few words on the subject of epidemic and contagious disease. At the outset, we are met by a question, the answer to which may one day lead to the most sweeping changes, not only in the remedial, but also in the hygienic treatment of disease. What is infection? Our whole practice in regard to it is based on an hypothesis; the practical sanitarian cannot pause, and while rival schools are debating the existence of an actual *materies morbi*, whether as germ or soluble ferment, he does battle as he can with the disease and death around him. What may be done where energy and heart are devoted to the work has been shown in not a few instances which might be

cited, where efficient inspection, followed by thorough disinfection of the house, the drains, and the neighboring sewers, with attention to water supply, cleanliness, and the ordinary sanitary conditions, have been the means by which it has been possible to effect an incalculable saving of life, and, in more instances than one, to stamp out effectually, and at once, the first invasion of a deadly disease. Yet, there are cities, not a few, which boast of their cleanliness and health, where the poison of disease is allowed to fester and spread from street to street, unchecked and almost unheeded — where, if the sewers are attended to, no public provision exists for disinfection — where, through lack of a public mortuary, the dead lie too often among the living, and where children are allowed to infect their fellows in the school, or in their common playground, the street.

The difficulties of contending with epidemic disease are acknowledged to be great, and, with our present sanitary machinery, in some cases almost insuperable. But we stand in a different position with respect to the most fatal of all contagions — that of small-pox; and the various enactments respecting vaccination which have issued since the date of Jenner's immortal discovery, are but types of the half-hearted and inefficient legislation which deals with the Public Health. A disease which, by strict attention to vaccination and preventive hygiene, might be stamped out forever, still claims its victims in our healthiest towns, where vaccination has become unfashionable, and has fallen into partial disuse.

SANITARY SENSE. — If a people has no *faith* in cleanliness, no *faith* in wholesome air and pure water; if they are not themselves convinced of the dangers of over-crowding and of epidemic disease, their ignorance and scepticism become the gravest obstacles to improvement. Some rudimentary instruction in sanitary matters is urgently needed, not only in our institutions and schools for the poor, but in all our common and higher grade schools as well. The sanitary sense should be carefully cultivated in the young; and we might then hope, by a ready obedience to the reasonable laws of Health, to attain at last that "Harmony of the moral Nature" which is the end and aim of all true Sanitary Science.

TEA WINE. — Tea and moss up to the present time have not been regarded by total abstainers as containing any intoxicating properties; but for the future they will be looked upon with considerable suspicion. "The cup that cheers, but not inebriates," has been found by Dr. Thudichum to be capable of yielding a very excellent wine, wholesome and pleasant to the taste; while M. Stenburg, the Professor of Chemistry at Stockholm, has succeeded in extracting, by distillation, alcohol and brandy, from the Iceland Reindeer Moss. The starch, which it contains in large quantities, is transformed into grape sugar, and subsequently fermented. The value of the discovery lies not so much, perhaps, in the production of the alcohol as in the substitution of the Iceland Moss for other and more valuable grain crops, which are at present grown solely for distillation.

PROF. TYNDALL will have much to answer for in the results that may be expected from the spread of his "dust and disease" theory. It is stated by the *Athenæum* that a new idea has been broached in a recent lecture by Mr. Bloxam, the lecturer on chemistry to the department of artillery studies. He suggests that the committee on explosives, abandoning gun cotton, should collect the germs of small-pox and similar malignant diseases, in cotton or other dust-collecting substances, and load shells with them. We should then hear of an enemy dislodged from his position by a volley of tyhpus, or a few rounds of Asiatic cholera. We shall expect to receive the particulars of a new "Sale of Poisons" Act, imposing the strictest regulations on the sale by chemists and apothecaries of packets of "cholera germs" or "small-pox seed."

IS MINERAL MATTER CAPABLE OF ASSIMILATION?

BY PROF. E. N. HORSFORD, CAMBRIDGE.

AN article under the title "Our Bread," in the October number of "Good Health," contains the following statement: "Phosphorus is a very essential ingredient for the nerve-cells, while sulphur is a most necessary constituent of human bile. In no way can we substitute either in an artificial way. We might eat all the sulphur and all the phosphoric acid we please, without adding the least particle to our blood-formula."

This statement suffers from at least two misapprehensions on the part of the author: —

First, that there is phosphorus as such, or in some other form than that of a constituent of phosphoric acid in the nerve-cells and blood; and

Second, that this constituent cannot be supplied to the blood by taking some form of phosphoric acid as food.

In regard to the first, there is no evidence that phosphorus exists in healthful tissues, including the blood, in any other form than as a constituent of phosphoric acid. This is equally true of the albumenoids contained in grains; and of this any one may satisfy himself fully, if he will saturate a grain of wheat with sulphate of copper, and examine a thin section of the grain thus charged with the microscope. He will find the gluten cells filled with a bluish-green compound of phosphoric acid and copper; or if the wheat grain, or ordinary miller's bran be digested with weak acetic acid, and the infusion carefully examined, it will be found to contain phosphoric acid. This is the phosphoric acid which, chiefly, in the form of phosphate of potassa goes into the flour, but which to a very much greater extent is lost with the bran. Of the existence of phosphorus in the gluten of wheat, in any other form than as a constituent of phosphoric acid in some phosphate, science has as yet given no evidence; and the phosphoric acid recognized in gluten, is as simply and purely phosphoric acid, as that of any phosphate in the laboratory. Of this phosphoric acid, Professor Grace Calvert, in a research presented last summer to the British Association, and published in the English and Continentals Journals, was able to separate a large part, directly, by the action of water. He says, referring to the results of analysis, "These numbers show that the largest part of the phosphates of wheat are not in combination with the organic substance, but are present in *free condition*. They show further that the largest part of the phosphates present in wheat are soluble, and that in these soluble salts the phosphoric acid is combined with potassa and magnesia, while in the insoluble phosphates the bases are represented by lime, oxide of iron, and a small quantity of magnesia."

But let us look into the animal organism: "Phosphorus," the author of "Our Bread," says, "is a very essential ingredient for the nerve-cells." This is only true in the sense that wherever phosphoric acid is, there all its elements must be present. Liebreich found *Protagon* the principal constituent of cerebral and nerve tissue, to be a *phosphate*, in which the phosphoric acid was combined with glycerine and a compound ammonia, united with various fats, as margarine, oleine, etc. The same body has been found in the corpuscles of the blood, and in the yellow of the egg, — destined to become portions of the blood, and brain, and nerve-cells of the future chick. These results have been confirmed by Hoppe-Seyler, and numerous other chemists. The phosphoric acid thus present contains all the phosphorus, which, in earlier times, was supposed to be combined in some mysterious way as an element of phosphorized fats. From some forms of muscle, it may be easily disengaged. It is drawn out from salted meats in pickling, and is found in the brine; and what remains is known to possess reduced nutritive value. Scurvy follows too close confinement to a diet in which salted meats are the chief article of food. Phos-

phoric acid is so loosely combined in the fibre of fish muscle, that it readily dissolves away in water, and may be easily recognized by appropriate tests. A diet in which fish is a prominent constituent, is conceived by some to be especially suited to persons engaged in severe labor of the brain. Virchow recognized phosphate of potassa as it exuded from muscle in *rigor mortis*,—the stiffening that follows death.

Second. The author asserts that "in no way can we substitute * * * phosphorus in an artificial way. We might eat all the phosphoric acid we please, without adding the least particle to our blood-formula." Let us see how this statement will bear examination. When we prepare acid—phosphate of lime, magnesia, potassa or iron, by treatment of burned bones or mineral phosphate with sulphuric acid, and spread it as superphosphate on soils, it is taken up through the roots and deposited as phosphate in the bran and flour of the wheat, and we eat it as a constituent of the gluten. When we add the same phosphate to the flour in making the bread, it enters the stomach just as much a phosphate as if it had come in with the bran, and it passes from the stomach to become a constituent of the chyle and the blood, just as much in the one case as in the other.

Let us glance a moment at the conclusion to which we are driven by the assumption of the general principle that the so-called artificial introduction of the mineral constituents of the organism will not add to the constituents or "formula" of the blood. If compounds of phosphoric acid or phosphates may not be supplied to the food, where deficient, because of their mineral origin, what is there to justify the use of salt! Can any one who knows anything of physiology or of chemistry say that the soda of the common salt we eat does not contribute to the phosphate of soda of the blood; the phosphoric acid of which received with the food, was for the most part in the form of phosphate of potassa? Or can we believe that iron administered as medicine does not become part and parcel of the blood? Or that the lime that fowls and birds generally, of both sexes, crave, and must have with their food, does not contribute to the lime of their bones, or the fibrine of their blood? The habits of wild animals in seeking salt licks, show that the taste for salt is not an artificial one. Their blood demands phosphate of soda, while their food furnishes chiefly phosphate of potassa. The experiments of Chossat, in 1844, demonstrated that pigeons could not be sustained on pure wheat. In time their bones became spongy and friable, and at length the birds perished. But supplied with lime—either as phosphate or carbonate, with the wheat, their health was maintained, or entirely restored, after having been greatly impaired from eating pure wheat alone. The explanation is simple: wheat contains a great excess of phosphate of potassa, and but little phosphate of lime. With lime introduced into the stomach in the form of carbonate, mutual decomposition yields phosphate of lime, which is essential to the formation of bones, and to a less extent of other tissues. To show how absurd the doctrine that mineral matter cannot add to the "formula" of the blood is,—let us consider for a moment what a thoroughly pure mineral substance water is! Will it be maintained that none of all the water we drink becomes part of the organism!

There is another consideration that should have place in the discussion of this question: the assimilation of mineral matter is an essential condition of organized life. It is the plain law of development—of growth and repair—the law of nature.

The observations of Pasteur showed that humbler plants and animals alike possess the power of appropriating the phosphates of purely mineral origin to build up their tissues; and nothing has yet been discovered to show that the higher forms of animal life, including man, are deficient in any of the powers of assimilation, possessed by the humbler types of animal life.

"DEATH is nothing else than an operation of nature; and if any one is afraid of an operation of nature, he is a child."

TEA AND COFFEE.

OF the hot drinks that form the daily refreshment of the human race, infusions of leaves stand pre-eminent, and particularly those derived from one or other of the various tea plants, which are consumed by more people than all the others united. Tea forms the beverage of the three hundred millions that inhabit China; it is largely in use by the natives of Japan, Thibet, and Nepaul; in Asiatic Russia the poorest enjoy it; whilst in Europe, the United States, Canada, British America, and Australasia, all classes are unanimous in its praise.

Somewhat akin to tea is *maté*, the leaves of the *Ilex Paraguayensis*, or Brazilian holly. Although not consumed over such a wide area as tea proper, it is as much the universal beverage of the southern American republics as China and Assam tea are of Europe and Asia; but it labors under the disadvantages of being somewhat deficient in theine (the active principle of tea and coffee), and becoming black and unsightly if left to cool. This tendency to darken is owing to a considerable amount of astringent acid, similar to the tannin of oak bark, which enters into its composition.

The principle to which both beverages owe their popularity, exists in the former to the extent of .5 per cent. in green, 2.55 per cent. in black, and 1.25 per cent. in the latter. It is a remarkable substance, and well merits a special paragraph. If tea or maté leaves, reduced to an impalpable powder, be placed on a watch glass covered with a white paper cone and subjected to a gentle heat, minute colorless crystals collect in the form of a sublimate, inside the cone. They are known amongst chemists as theine or caffeine, and are almost identical in their composition. Theine has no smell, a very slightly bitter taste, and seems to exercise little influence on the flavor or smell of the leaves from which it is extracted. But, although quiescent in the leaf, its wonderful properties at once make themselves felt when introduced into the animal economy. Theine is one of a small group of substances which are remarkably rich in nitrogen, possessing nearly three-tenths of its weight of that element, a quantity which exists in only a very few other known compounds. Its chemical composition is as follows: —

Carbon	49.80
Hydrogen	5.08
Nitrogen	28.83
Oxygen	16.29
	100.00

If we divide ordinary wheat into two parts, viz., the gluten or sustaining portion, and the starch, or heat-imparting element, we find that theine fulfils the functions of the former. Possessing this extraordinary property, it stands to a certain extent in the place of food, by lessening the natural waste of the body, so that old people who can no longer digest enough of ordinary food, find in good tea, food, medicine, a gentle stimulant, a solace to their failing strength, a prop to their declining years. No wonder, therefore, that the fragrant beverage should be equally acceptable to the aged millionaire confined to his luxurious and palatial residence, and the poor seamstress stitching in her forlorn attic.

It must be evident even to the most desultory reader that any new product capable of use as tea or maté, and containing a fair proportion of the same chemical constituent which distinguishes them, is entitled to a niche in popular favor. Such a position we claim for prepared coffee leaves. So far back as the year 1845, Professor Blume, of Leyden, who had spent much time in Java, pointed out that an infusion of roasted coffee leaves had from time immemorial been a favorite beverage among the natives of the Eastern Archipelago. In Sumatra, especially, it formed the only drink of the entire population. Mr. Ward, resident many years at Pedang, in Sumatra, thus wrote to the *Pharmaceutical Journal* (vol. xiii., page 208): "As a beverage, the natives universally prefer the

leaf to the berry, giving as a reason that it contains more of the bitter principle and is more nutritious." This is borne out by analysis, it being found that roasted coffee-leaves contain about 1.25 per cent. of theine or caffeine (the same amount present in maté), prepared coffee beans only yielding from 0.117 to 1.08 per cent. The same author continues: "In the lowlands, coffee is not planted for the berry, not being sufficiently productive; but for the leaf the people plant it round their houses for their own use. It is an undoubted fact that everywhere they prefer the leaf to the berry. While the culture of the coffee plant for its fruit is limited to particular soils and more elevated climates, it may be grown for the leaf wherever, within the tropics, the soil is sufficiently fertile."

The beverage called coffee is an infusion, or, more generally, as prepared in this country, a decoction, of the roasted and ground seeds of a shrub called by botanists the *coffea arabica*. This plant has, however, many varieties, which are named after the various countries where they are produced, such as the *coffea mauritiana*, from Mauritius, etc.; but the true *coffee arabica* always keeps the lead in the market.

The *coffea arabica* is said to grow wild in the mountainous districts of Abyssinia, and appears to have been roasted and infused by the people of that country from the earliest ages. We next hear of its use in Persia, and subsequently of its introduction into Arabia and Constantinople. The Greeks, with their natural aptitude for trade, soon took the matter up, spreading its use abroad, and, as we are told by Dr. Johnson, it was first sold as a beverage in London by a scion of that enterprising race named Pasqua, in 1652. Some years afterwards it was introduced into France, and soon began to take such a hold upon the taste of Europeans, as to become, what it now is, one of the most universal beverages throughout the entire civilized portion of the world.

The coffee plant, which sometimes attains the height of eighteen or even twenty feet, but is more generally about ten feet in altitude, comes into a state of maturity as regards production of berries in three years after it is planted, and usually continues to be fruitful for fifteen years. It bears a white flower, which quickly changes to a fruit, in the heart of which the coffee seeds, commonly but erroneously called berries, are deposited. The fruit when ripe is plucked from the plant into bags, the pods subsequently opened, and the seeds removed, dried, and stored. The coffee is frequently kept in store for a long time before being sent into the market, because it is found to "ripen," or improve in aroma by keeping; indeed Mr. Ellis states, that common American coffee, if kept for ten years, will be quite equal to good Arabian.

The effect of coffee on the system is exhilarating, while it yet soothes, lessens the desire for solid nourishment, and retards the waste of the tissues. It enables persons to bear fatigue, both mental and bodily, and is constantly much in vogue with those "who burn the midnight oil." It has been stated by the advocates of temperance principles to be much better than alcohol as a counter-agent against the extreme temperature of a northern winter, and that those who partake of the latter substance, under the various pretexts of "taking the chill off," or "just a toothful to keep out the cold," would be much better protected if they could be persuaded to take their "nip" in the shape of a cup of coffee. The wakeful properties of coffee are well known, and it is this which undoubtedly gave rise to the amusing, though improbable, story of its discovery. It seems, so saith this veracious legend, that an Abyssinian owned an ass, which he tied nightly to a bush adjoining his tent. Hitherto the patient animal had not rendered the shades of evening hideous by unwonted sounds, but all at once it gave evidences of wakefulness, and disturbed its master's rest by loud vocal demonstrations. Notwithstanding the kicks and thumps showered upon its devoted carcase by its irate lord, it persevered in nocturnal braying. Worn out at length, he watched and observed the animal eat, with infinite relish, a

quantity of berries from the bush. Struck with a bright idea, he did so likewise, but, failing to discover any merit in the fruit, he roasted it, and found that his eyes were opened, that sleep was hindered, and that in fact he had made a valuable discovery; and so in future he changed the donkey's quarters, and appropriated the fragrant coffee to his own use.

These effects of coffee are due to three principles which it contains, viz.: (1) a *volatile oil*; (2) a substance called *caffeic acid*; and (3) an alkaloid called *theine* or *caffeine*. The volatile oil does not exist in the raw seed, but is developed in the process of roasting; and direct experiments have shown that we must, in some measure, ascribe to this oil the exhilarating effects of coffee. The caffeic acid is an astringent body akin to tannic acid, and, although it is somewhat altered in the roasting, Dr. Stenhouse states that "chemists generally are disposed to refer the flavor and peculiar properties of coffee as a beverage more to this acid than any other constituent." The third important matter in coffee is theine, or caffeine.

The exact composition of coffee will be apparent from the following analysis by M. Payen:—

Cellulose	34.000
Water	12.000
Fatty substances	13.000
Glucose, dextrine, and vegetable acid	15.500
Legumine, caseine, (gluten)	10.000
Caffeate of potash and caffeine	5.000
Nitrogenous substances	3.000
Free caffeine	0.800
Concrete essential oil	0.001
Aromatic fluid essential oil	0.002
Mineral matter	6.697
	100.000

In addition to the above, Dr. Stenhouse states, that coffee contains 7 per cent. of cane sugar.

From all these considerations, it is evident that coffee is an article for which it is not easy to find an imitation; as any other plant, to be equally useful, must contain the three important constituents above referred to: and there is apparently no other seed known, which would fully answer as a substitute in this respect. Looking to the great activity and peculiar properties of these substances, we cannot help seeing that, in permitting, as we now do, the admixture with coffee of vegetable matters totally devoid of them, we allow a serious injury to be done to many who depend on this beverage as an aid to the quickening and endurance of both their mental and bodily powers.

WILL DISEASE TERMINATE IN HEALTH WITHOUT THE USE OF MEDICINE. — The people are uniformly led to believe that it will not. Almost every practising physician prescribes as if the life of his patient depended upon the remedies given, and claim any favorable change in disease, and the final getting well, as the result of his medication. Many, no doubt, conscientiously believe that the sick live by medicine, and would die without it, and no matter how crude or irrational the practice, the getting well is due to it.

No man is in a condition to adopt a *rational practice*, until he is satisfied that in all diseases a very large percentage will recover without medicine. Or to state it in different language, until he is satisfied that the mortality will be a very small percentage. It has been conclusively proven by some of the best observers in England and Germany, that the mortality in the gravest of the acute diseases is but from one to five per cent. with diet and rest alone. The observations were of inflammations of all the important organs, and of the continued fevers, including epidemics and endemics of typhus and typhoid. It was not based upon closet practice, nor a few mild cases in private practice, but took hundreds of cases in hospital practice where records were carefully kept.

When a man is satisfied that the natural tendency of all disease is to recovery, and the province of medicine is *not* to save life, he is ready to ask himself the question, *what is the province of medicine?* I should answer the question in this way: It is to mitigate suffering and render the patient as comfortable as possible. It is to aid nature, lessen the duration of the disease, and to give a good recovery without structural lesion. — *Eclec. Med. Jour.*

THE CIRCULATION OF THE BLOOD.

BY ROBERT WHITE, JR., M.D., BOSTON.

First Paper.

CHEMISTRY, the microscope, and the other advantages of research which the advance of science has given, when united to a thorough knowledge of Anatomy and Physiology, enables us to trace the blood through every stage of its change, discovers to us all the avenues through which it passes, however minute and intricate they may be, and points out to us the modus operandi by which the body is supplied with new material for assimilation, and the manner in which the "waste" produced by the wear and tear of the system in its every-day life is carried off. Yet, despite the facility with which we now recognize all these important facts, the theory of the circulation of the blood was never practically demonstrated until Wm. Harvey, an English surgeon of Charles First's time, proved it, although Hippocrates and Aristotle had some idea of it, and Servetus taught it publicly, and was burnt at the stake for his temerity just a century before Harvey publicly advanced the theory anew in 1625, and supported it by reports and demonstrations of his experiments on living animals. Oddly enough, his "Report on the Circulation of the Blood," though so old, and the first published, is the best description of the circulation, and of the movements of the heart, in existence to-day. He obtained the first correct idea of the heart's movements, by opening the chests of living animals, sustaining life by artificial respiration, while he observed the movements of the organ in its natural position. When a correct knowledge of the circulation was gained, it more effectually aided to establish the science of medicine on a true and perfect basis, than any other discovery ever made in connection with it. The shortest general description of the manner in which the circulation is carried on will be this, — a central organ in the chest — the heart — acting as an engine or pump — as you please — one portion of it sending the blood out by a set of pipes — the arteries — all over the body to the head, trunk, limbs, skin, muscles, etc., receiving it back again by another line of pipes — the veins — then a different action of the heart forcing the blood into the lungs by another system of vessels — the pulmonary arteries — to be purified, and the renewed blood coming back to the heart by the pulmonary veins, to be immediately sent over the body again; thus you see the term circulation of the blood is well applied, as the fluid, in its course through the system, does move continually in a circle, starting from a central point, and returning to it after it has completed the circuit.

The Heart.

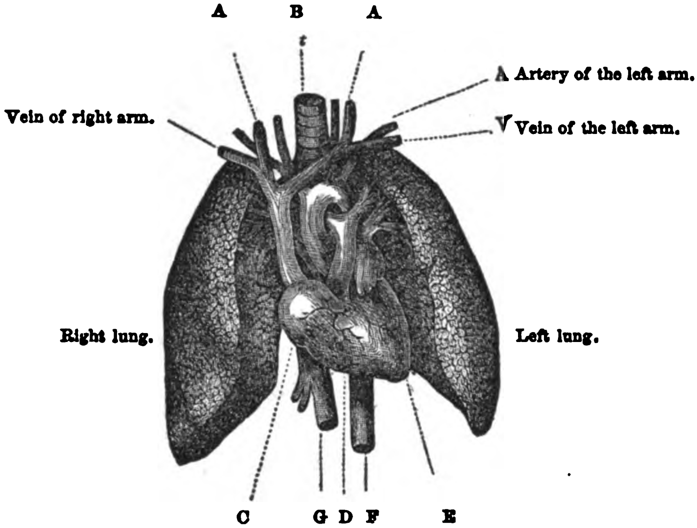
For a proper knowledge of the subject, we must first consider the heart itself, which is the great central organ, the seat of life, the engine which supplies the power for the beautiful and delicate machinery used in carrying into effect the great purpose for which the circulation was given so prominent a place in the human economy.

The location of the organ is well known; occupying, as it does, a space about the breadth of a palm to the left of the breast-bone, with the point pulsating just below the nipple of the breast of the same side, and is enclosed in the bony cavity of the chest formed by the sternum or breast-bone, ribs or vertebra. The heart, as constituted, is a hollow muscle of four cavities, two on each side, with several large vessels opening into them, and supplied with nerves and blood-vessels for its own nourishment, etc. In shape it bears but a slight resemblance to the representation of it usually seen on valentines, moulded in confectionery etc., as flat, thin, symmetrically curved, and sharp pointed, but, on the contrary, is full, round, and irregular at the top in shape.

A good idea of its true form can be gained by an inspection of a sheep's heart, which bears a close resemblance, in shape and size, to the human heart. It lies in the chest in front of, and between the lungs, suspended in a soft membranous bag, — the pericardium — which secretes a fluid for the double purpose of keeping the membrane itself moist, and thus presenting a smooth slippery surface for the heart to glide over in its movements, and supplying just fluid enough for the organ to move in with freedom. The engraving at the head of this article will illustrate the position and relations of the heart, lungs, and great vessels (Plate 1). This is the appearance presented when the ribs and sternum are removed.

As we have before stated, the heart is a *double* organ, with two sets of chambers, each acting independently in a measure of the other, and each set containing blood of a different character, the chambers on the right side containing venous or impure blood, and those on the left side pure arterial blood. The inside of these cavities is lined with a smooth shining membrane, which presents a favorable surface for the blood to glide over. The right, or *venous* side of the heart, as well as the left, or *arterial* side, consists of two chambers, an upper one, — the auricle, — and lower one, — the ventricle, — with an opening between each auricle and ventricle, but no communication between the two auricles or between the two ventricles. The auricle on the right side receives the blood on its return from its course through the system, from two great veins, the venæ cavæ, in which all the other veins of the body terminate. This blood, which has discharged its main office, viz., supplying the different tissues of the body with material for nutrition, and is loaded with the effete matters and refuse of the system, is forced into the lower chamber or ventricle just beneath the auricle, by a power of contraction which the auricle, in common with all other parts of the heart, possesses; from here it is in turn expelled by the contraction of the ventricle through a large vessel, — the pulmonary artery, — whence it passes to the lungs, and coming in contact with

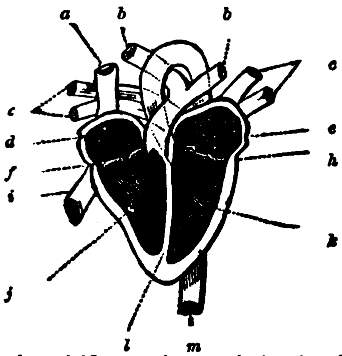
Plate 1.



The Heart, Lungs, and Principal Vessels in Man.—A A, the two jugular veins. B, the trachea, or windpipe. C, the right auricle of the heart. D, right ventricle. E, the left ventricle; the left auricle is seen just above the ventricle. F, the aorta. G, the great vein which brings impure blood from the abdomen and lower limbs. In the engraving the left lung is represented as lifted up and held back, in order to expose the heart.

the air, it is oxygenated or ærated, purified of most of its effete elements, by yielding up the carbonic acid gas

Plate 2.



The heart laid open, showing the interior of the auricles and ventricles, and situation of the valves. *a*, great upper vein. *b b*, pulmonary artery. *c c*, pulmonary veins. *d*, right auricle. *e*, left auricle. *f*, tricuspid valve. *h*, mitral valve. *i*, great lower vein. *j*, right ventricle. *k*, left ventricle. *l*, partition between auricles and ventricles. *m*, aorta.

with which it is impregnated, and taking oxygen from the air contained in the respiratory vesicles of the lungs, and is thus rendered fit for a new course through the body. When the pulmonary arteries enter the lungs, they divide into innumerable little branches which extend through the substance of the lungs, and come in contact with the small branches of the bronchi, or air-tubes. A thin permeable membrane alone divides the vessels through which the air reaches the blood, imparts to it the vital principles of the air, and relieves the blood of the effete matters it has accumulated during its passage through the system, and which render it poisonous and unfit for nutrition until it has been purified. It will be seen that the blood does not come in actual contact with the air, but is separated from it by the thin respiratory membrane spoken of, and the oxygen and carbonic acid gas are exchanged through this membrane. The blood passes from the minute terminal branches of the pulmonary artery in the lungs into the similar branches of the pulmonary veins, which communicate freely with the arterial capillaries, and end in four large veins opening into the upper chamber or auricle of the left, or arterial side of the heart.

This pulmonary circulation just described is an independent one, carrying the venous blood from the chambers on the right side of the heart to the lungs to be purified, and back again from the lungs to the left side of the heart. It is quite distinct from the corporeal circulation in which the arterialized blood passes from the left auricle (into which it has just been received from the lungs) into the ventricle beneath, and by the contraction of the ventricle it is forced into the aorta, or main artery of the body, and from this passes through innumerable subdivisions of arteries, until their ramifications become so minute that they can only be traced by the microscope. The fact that we cannot prick the point of the finger with the finest needle without wounding one of these vessels and drawing blood, proves how extensive and minute their ramifications are, and they are distributed thickly through the most remote parts of the body, no portion of it being so distant or so minute, but it requires their presence for its nutrition, and they penetrate even the substance of the bones, the base of the nails, and glands of the hair, as well as the most delicate and transparent parts of the eye. During the passage of the blood through this extensive system of vessels, all the tissues of the body have been appropriating from it the materials needed for the entire animal system, the muscular and nervous systems, and the bones, finding in it the material needed for their repair and for maintaining them in a healthy condition; and the waste material, the result of the wear and tear of the system, has been discharged into it, and the blood having arrived at the termination of the arterial capillaries, is taken up by the capillaries of the veins, carried back to the heart through the venous system, emptied into the right auricle, and again goes through the right ventricle and pulmonary artery to the lungs. Just previous to reaching the right auricle, the blood receives into it the products of digestion; and, for the benefit of those who may not have a proper

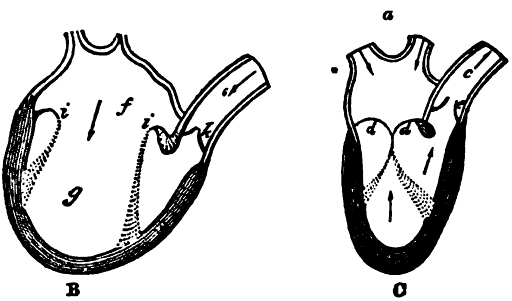
knowledge of the process of digestion, and of the manner in which food is converted into material fit for mixture with the blood, I will simply say, that after being received into the stomach, the food is converted into a milky fluid, mainly by the action of different secretions of the stomach and intestines, and it is conveyed from the intestines by the process of absorption through a set of vessels, which terminate in a common receptacle in the centre of the body; and the contents of this receptacle are poured into one of the large veins just before it reaches the right auricle of the heart, so that a few hours after each meal a supply of material for new blood is added to that in the vessels. This *pabulum*, or prepared food, is mixed with the venous blood, and in common with it is carried to the lungs to be purified.

Contraction of the Heart.

The power of contraction which the heart possesses, and which is the mainspring of its action, is due chiefly to the form of its construction; it being, as before stated, a hollow muscle, the fibres being spiral and circular in their arrangement, and are thus capable of enclosing and contracting on the auricles and ventricles, squeezing out the blood by almost the same action that a hand would squeeze water from a bladder, by being firmly closed on it. The auricle contracts in this way on the blood which has just been poured into it by the veins, squeezing the blood down into the ventricle, and immediately relaxes for the receipt of a new supply; and as the auricle dilates again, the *ventricle* contracts and sends the blood on through the artery. Now it will be asked, why does not the blood flow back again into the auricle as well as into the artery, when the ventricle contracts? This *would* occur if not prevented by sets of valves at each opening, which consist of two or three little flaps of membrane attached to the sides of the opening between the auricle and ventricle, and lying quietly on the side of the chamber while the blood pursues its onward course; but, like the floodgates in a stream, any movement of the fluid backwards closes them. Valves are placed between each auricle and ventricle, and here there is a peculiar arrangement of little muscular cords or strings (chordæ tendinæ) attaching the free ends of the valves to the side of the chamber. These cords regulate the motion of the valves, which in the right ventricle consists of three flaps of membrane (and is called the tricuspid or three-toothed valve), which being forced up by the attempted reflux of the blood on the contraction of the ventricle, meet in the centre of the opening between the auricle and ventricle, and are held in check by the little muscular cords, and thus effectually prevent the return of the blood to the auricle. When the ventricle relaxes at the end of the contraction, and the blood flows into it from the auricle on *its* contraction, the valves fall back again to the side of the chamber, and remain quiescent, until the attempted reflux of the blood on the next contraction of the ventricle forces them up again. This action of the valves is a truly wonderful contrivance, and no machine ever invented by man excels this in nicety and certainty of action; for while the valves remain in a healthy condition, it is impossible for the blood to flow otherwise than in the required direction. The blood having passed into the right ventricle, which dilates at the moment the auricle contracts, the walls of the ventricle close tightly on it, force the last drop of blood into the pulmonary artery, the valves, as we have shown, preventing any return of the fluid to the upper chamber. The blood then passes through the pulmonary artery to the lungs, valves being placed here again, to insure its flowing forwards, as the weight of the column of blood would of course tend to force itself back, but three valves, called *the semilunar valves*, from their half-moon shape, are placed at the opening of the artery, and lie quietly on the side of the vessel, pointing in the direction in which the blood should flow, but closing together when the force of the contraction of the ventricle is expended, and the column of blood tends to fall back. After being prepared in the lungs for its new course

through the body, the blood passes into the pulmonary veins through the communication between their capillaries to those of the pulmonary arteries, and, reaching the *left auricle* of the heart by these veins, the same system of alter-

Plate 8.



Diagrams illustrating the relative changes in the form of the auricle and ventricle during contraction. —Figure B, auricle contracting and pouring into ventricle. *f*, the auricle. *g*, the ventricle. *i i*, mitral valves open. *k*, semi-lunar valves of artery closed. Figure C, ventricle contracting and forcing the blood into the aorta. *a*, auricle. *b*, the ventricle. *d d*, mitral valves closed. *e*, semi-lunar valves open. *c*, the aorta. The arrows indicate the direction of the currents of blood.

nate contraction and relaxation, — the blood passing from the auricle to the ventricle and from the ventricle to the artery, — is repeated, so from the *left auricle* the fluid is forced into the *left ventricle* and out through the aorta over the whole body, valves being placed at the aorta again (*semilunar*, like those in the pulmonary artery), and at every other opening for keeping the blood in its proper course. It is the contraction of the left ventricle, and the consequent tilting up of its point (which forms the apex of the heart), that causes the impulse or "beat" which is felt on the outside of the chest between the fifth and sixth ribs of the left side. It is the impulse given to the blood by the heart's contraction, that sends the fluid rapidly on its course through the arteries, communicating the same motion to the vessels themselves (mainly on account of the elasticity of their coats), and which constitutes the "pulse," which is felt wherever the arteries approach the surface, as in the wrist and temple. We will dilate further on this subject of the pulse, when speaking of the arteries.

The number of the heart's contractions in a healthy person, amount to nearly seventy-five in the minute, or about four thousand per hour: nearly ten thousand contractions and relaxations daily. The rapidity of its contraction and relaxation, and the amount of work it performs, is wonderful. Think of three hundred and fifty pounds of blood passing through the heart every hour, or all the blood in the body (some twenty-five pounds) being forced through every five minutes! When we think of this fact in connection with large animals, the effect is wonderful. The heart of a whale throws out a dozen gallons of blood at every pulsation, and the aorta is a foot in diameter. In so large an animal the blood rushes through the larger vessels with the force and velocity of a torrent. It is wonderful that a machine so delicately constructed, and required to labor so incessantly, should be able to perform its functions steadily without a moment's rest or cessation for sixty, seventy, or eighty years, without great liability to get out of order in some of its delicate parts, and without the necessity of repair or renewal; yet so it is, and the whole idea gained from a knowledge of this wonderful organization is one calculated to fill the mind with admiration and reverence for the power of the Creator.

In our next number we will speak of the sounds or rhythm of the heart, and of the action of the valves.

ON POISONS.

BY F. S. BARFF, M.A.

Second Paper.

LIVING, as we do, in an age when scientific discoveries have rendered the detection of certain poisons comparatively easy, we have no fear of systematic poisoning, as it was at one time carried on in Europe. The idea of a person dying slowly from a poison intentionally administered but rarely enters the mind, and but few cases of slow poisoning have occurred in this century. There is something positively fiendish in the disposition which can bear to be the cause of the terrible suffering produced by the continued administration of small doses of an irritant poison. One would think that the anxious looks, indicative of more than bodily pain, the excruciating agony, the delirious excitement, the blood-shot eyes, the nervous twitching of the body of the sufferer would appeal, and not in vain, to the poisoner for mercy. But to such depths of brutality can human beings fall, that history tells us of one who caused the death of not less than six hundred persons by a poison which owed its effects mainly to arsenic. A woman named Toffania, at Naples, in the seventeenth century, sold a poison which was called Aqua della Toffania, also Acquetta de Napoli. Six or eight drops of this poison were sufficient to destroy life. She was discovered and imprisoned in 1709. Confession of her crimes was extorted by the rack. She was afterwards strangled. The best authorities assert that this acquetta contained arsenic. The effects produced by this poison, which was tasteless and clear as water, are given by Dr. Christison. "A certain indescribable change is felt over the whole body, which leads the person to complain to his physician. The physician examines and reflects, but finds no symptoms, either external or internal — no constipation, no vomiting, no inflammation, no fever. In short, he can advise only patience, strict regimen, and laxatives. The malady, however, creeps on, and the physician is again sent for. Still he cannot detect any symptom of note. He infers that there is some stagnation or corrupting of the humors, and again advises laxatives. Meanwhile the poison takes firmer hold of the system; languor, weariness, and loathing of food continue; the nobler organs gradually become torpid, and the lungs in particular at length begin to suffer. In a word, the malady is from the first incurable; the unhappy victim pines away insensibly, even in the hands of the physician; and thus is he brought to a miserable end through months or years, according to his enemy's desire." In the description given by Hahneman of the effects of this poison, the sufferings are stated to be most intense. In a later case, in which Dr. Christison was consulted by the Crown, where death was produced by *slow* poisoning by arsenic, the symptoms were of a character too painful to be recorded here. The symptoms of *acute* poisoning by arsenic have already been described in the first article on poisons. In slow poisoning they differ in some respects, the effect of the poison on the nervous system is more marked; there is frequently paralysis of the limbs, partial or entire. It sometimes begins in the hands, and then extends to the arm. Sometimes epileptoid seizures occur, and sometimes there are spasms, such as occur in tetanus (lock-jaw). Even after recovery, the paralytic state frequently continues for some time. A case is related by Amatus Lusitanus in which mania occurred, the person became so mad as to burst his fetters, and jump out of the window of his apartment.

It has already been stated that arsenic is used in the manufacture of candles. Some years ago, some experiments were made by Mr. Everitt on

German candles. A great many examples of the so-called German wax or stearine composition candles were examined, and found to contain arsenious acid in varying quantities, from as much as ten grains to eighteen grains in the pound. Mr. Everitt also made experiments to determine in what form the arsenic leaves the candle during burning. He passed the products of combustion into a glass bulb, and through a tube eighteen inches long and one inch wide, which was kept cool. A quantity of water was condensed in the tube, which was found to contain arsenious acid. A small quantity of a white sublimate was collected in that part of the tube immediately over the candle, which was proved to be arsenious acid. It was also discovered that the arsenic was used in the form of arsenious acid, for when different parts of a candle were analyzed, it was found that the upper part contained more of this substance than the lower; and this would be accounted for by the fact that candles are allowed to cool with their tops downwards, so that, while cooling, the arsenious acid would by its weight, for it is heavy, sink down to the lower part of the candle-mould. From this irregularity of the mixture in one candle, it may fairly be concluded that there might be an irregularity in the composition of the mixture of which the candles are made, and thus a large quantity of arsenic might be collected in any one particular candle, and so very dangerous consequences might ensue. Next to arsenic, the chemist usually considers antimony, from the analogies which exist between them; but the toxicologist, regarding poisons from their action on the body, places mercury next in succession. The salt of mercury, which most commonly produces poisonous effects, is called corrosive sublimate — it destroys the membranes with which it comes in contact, corroding them rapidly. When applied to the skin of the body in strong solution, it destroys it, and causes it to peel off. This substance is eminently a corrosive poison; no sooner has it been swallowed, than its effects are felt, even before it has passed into the stomach, its peculiar metallic (styptic) taste being easily recognized. The vapor of corrosive sublimate is exceedingly irritating to the mucous surfaces, and after it has been once smelt, it is not easy to forget its odor. Corrosive sublimate, or as it is called by chemists, mercuric chloride, is a white crystalline substance; it is heavy, and so great is its weight, that it serves to distinguish it from other crystalline substances used in medicine. It is formed by the direct union of mercury and chlorine gas, and the relative proportions in which these elements unite to form it, are 200 parts of mercury, by weight, to 71 of chlorine. It is usually made by heating mercuric sulphate with common salt; 296 parts, by weight, of the former, with 117 parts of the latter. Sodic sulphate is formed, and mercuric chloride passes over in the state of vapor, and is condensed. Corrosive sublimate is very soluble in water, but more so in ether. When a solution of it in water is shaken up with ether, the ether takes the corrosive sublimate from the water, and being lighter than water, it floats on its surface. This property is made useful, as will be afterwards seen, in the description of the analysis for mercury. Common salt assists its solution in water, and this is also a matter of importance, as salt, being used as an article of food, is often present in considerable quantities in the stomach. It is more soluble in alcohol than in water, and in boiling than in cold water. It is usually seen in the form of a white powder, often containing fragments of crystals. If this powder be gently heated in a reduction tube, it wholly volatilizes and again deposits on the cool part of the tube. The crystalline forms which it assumes are very beautiful. If the reduction tube be very small, about one inch long and a quarter of an inch wide, it is easy to sublime it, and collect it on a glass slide for microscopical observation.

The crystals are needle-shaped, intermixed, with beautiful stellate forms.

It will be necessary to recur to these various crystalline forms when treating of the analysis for mercury. Corrosive sublimate is used in medicine, but in very small doses, in scaly diseases of the skin, and as an alterative in certain chronic diseases. It is also applied externally in the forms of lotions and gargles, to diseased mucous surfaces, and sometimes in ointments in chronic skin diseases. When taken in poisonous doses, it acts as a very powerful irritant, causing a burning pain in the epigastrium (the region over the stomach), vomiting and purging. These symptoms come on almost as soon as the poison has been swallowed; the throat appears to be stopped up, or constricted; the styptic taste before alluded to, is at once perceived, and resembles the sensation produced by sucking a penny. The throat becomes tender, and pain is increased by pressure. The rapidity with which the throat symptoms come on is so great, that persons have been warned in time, while in the act of swallowing, and have ceased to drink the fatal poison. With corrosive sublimate, the throat symptoms are much more marked than in arsenic poisoning, that is, if the solution be not too largely diluted. Occasionally death has occurred without the poison passing into the stomach. A young woman who tried to swallow two drachms of corrosive sublimate, in the solid state, was unable to force it down on account of the constriction of the gullet. She died in six days, of mortification of the throat.* The stomach symptoms are usually very decided, the pain which is felt is increased by pressure, but in some cases it is absent. The matters brought from the stomach by vomiting are usually viscid and stringy, and contain, often, large quantities of blood. In this respect there is some difference from the effects produced by arsenic — corrosive sublimate, acting more as a corrosive and local irritant, causes greater discharges of blood. The countenance varies under the action of these two poisons; by arsenic it is sometimes caused to have a ghastly and contracted appearance, but with corrosive sublimate it is swollen and flushed; in this respect, however, there are differences in different cases, for some have a pale and anxious look. The pulse is always quick, sometimes it is full; in others it is small, as it varies with the condition of the patient, for he may be either in a state of fever or of collapse.

Death usually occurs by syncope, *i. e.*, in a fit of fainting: it may be preceded by convulsions, or may take place in a fit of them. Diarrhœa is generally very profuse; but other excretions are generally suppressed. Corrosive sublimate seems to affect the nervous system more than arsenic during the inflammatory stage; the tendency to drowsiness is greater, tremors and twitchings of the extremities are more marked and frequent. There is more stupor, sometimes absolute coma, and sometimes paralysis of the lower half of the body.

The quantity of corrosive sublimate necessary to cause death is not easily ascertained. A child has been killed by three grains, and recovery has taken place after as much as half an ounce has been swallowed. The time in which the poison causes death is also very uncertain; it varies from two hours and a half to eleven days. It must be remembered that corrosive sublimate is much more soluble than arsenious acid, that its effects manifest themselves earlier, and that from its solubility it may be more easily got out of the body. Arsenious acid has been found adhering to the coats of the stomach after several days, and even encysted by the mucous secretion of the stomach.

Again, soluble mercury salts form compounds with certain organic substances which they meet with in the stomach, and these compounds are not dissolved, and therefore remain harmless until they are got rid of. For these reasons large doses may be taken whose effects may be modified, and so it is hardly fair to say that such a quantity as half an ounce can be taken without fatal results. A strong girl

* Case related by Dr. J. Johnstone, recorded by Dr. Christison.

swallowed, soon after supper, a drachm of corrosive sublimate, dissolved in beer. In a few minutes she was found on her knees in great torture. All the primary symptoms of this kind of poisoning were present in their most violent form; burning in the stomach, extending towards the throat and mouth, followed in a short time by vomiting of mucous, and then of bilious and bloody matters. The usual phenomena attending the excretions were observed. The pulse was small and contracted, the countenance anxious, and stupor considerable, which was interrupted by fits of increased pain. Subsequently the pain in the stomach became much easier, but that in the throat worse. At length, in the course of the second day, a profuse discharge of saliva took place, the gums became spongy and tender, and the patient died on the fourth day. In this case no doubt the food taken modified the action of the poison on the stomach, and death seems to have resulted from salivation, which is usually considered to be a secondary effect of mercurial poisoning. As to the time in which death may occur, Dr. Taylor relates a case of a man aged thirty, who was found dead. He had vomited some half-digested food. Near him was a drinking-horn containing about three drachms of corrosive sublimate. It was ascertained at the inquest that he had died from the effects of this poison. The man was last seen alive at half-past eleven the preceding evening, and was found dead at seven in the morning. His extremities were cold, and it was inferred that he could not have been dead less than six hours. This would make the duration of life only two hours after taking the poison.

Mercurial salts, when taken in large doses, or in small continuous doses, generally produce what is called salivation, the teeth become loose, the gums spongy and tender, the breath fœtid (having an odor peculiar to this affection), and the saliva flows freely. All persons are not liable to it. Some seem to resist the action of mercury altogether in this respect, others are affected by exceedingly small doses; and between these two extremes there are great variations in the effects produced by mercury compounds. Salivation may in its more severe forms produce most alarming symptoms. The face swells, the eyes are closed, the tongue may swell so as almost to produce suffocation, ulceration of the throat may occur; exfoliation of the bones, and gangrene and death may ensue from this secondary action of mercury. Now, inasmuch as some persons are more easily acted upon by mercury than others, it is clear that if a small dose of a mercurial salt can produce salivation, and salivation may cause death, a small dose may cause death in this way. And here great difficulties often arise in medico-legal investigation.

Children's Parties. — Children's parties are among the many peculiarities of our present social life. Doubtless children have always more or less had their parties. They assemble in the evening, and stay well on towards midnight. We shall leave to others the consideration of the moral consequences to the juvenile mind of this early acquaintance with all the forms of fashionable society, and shall confine ourselves to a consideration of the physical consequences, which we take to be injurious and undesirable. Children are excited beforehand, and still more at the time. They are dressed insufficiently, they dance themselves into great fatigue, they eat and drink at late evening hours what would try their digestion badly enough in its midday vigor, and worst of all, they lose from two to six hours' sleep. The ulterior consequences of this entire disarrangement of their habits and their functions are paleness, languor, and the development of various other ailments, according to the constitutional peculiarities of the children. By all means let children have their own gatherings, but let them be within reasonable hours. Let food be simple, dress sufficient and warm, and, above all, let not the precious hours of sleep be curtailed just when, by reason of excitement and exhaustion, they need to be extended.

THOUGHT-CHAINS.

BY CARL BOTH, BOSTON.

MANY people have doubtless been impressed with the idea that, notwithstanding the thousands of years of fighting, of argument, of teaching, of art, of thought, of literature, and of experience, the human family is in reality not much more intelligent, not much better or worse than it was thousands of years ago. Wandering through the libraries of civilized countries, the question naturally arises, How is it possible that, with so much thought and ingenuity, there is really so little common sense in men? Is it want of brain? Were we to take the brain of Shakespeare and that of the fashionable idiot, and place them together, we may safely challenge the anatomist to distinguish them. If, then, it is not the *mass* by which they are, or may be distinguished, it must be the *construction*. In this direction the busiest thinker was, in all probability, Blumenbach, whose collection of skulls in the Physiological Institute of Göttingen, continues to elicit the admiration of the student. Phrenology was one of the outgrowths of this study. But since anatomy has shown that the form of the brain has no direct connection with that of the skull, and that it is isolated in its cavity as the compass is isolated from the motion of the ship, — phrenology may be regarded not only as an exploded idea, but as a plaything for children, charlatans, hobbyists and fools.

How is it that one man is a genius, and another a fool? Why is the son of a thinker a fool, and the son of a simpleton a thinker? Why is not everybody a thinker, when all have the same brains and where all have the same education? The difficulty of answering these questions is more apparent than real. But we must go back to the earliest childhood.

In the February number of this journal, an interesting sketch of the anatomy of the brain was given for the benefit of the general reader. In this article we propose to present some features relative to the development of the brain.

The Development of the Brain compared to that of a City.

The brain, like the liver, lung, kidney, etc., is a gland consisting of cells. Before a child has breathed, its brain is an inactive mass, — the same as the lungs or kidneys. Although the brain cells are ready for action at a moment's notice, there is, previous to the first act of breathing, no use for them. It is the absorbed oxygen which awakes the brain cells out of their slumber. The development of the brain, so far as our present purpose is concerned, may be compared to that of a city. Every city, we may suppose, had its beginning with a single house; with the erection of more houses, streets became formed; then came whole blocks of houses, and finally whole city quarters, with large and small streets, giving squares, alleys, etc., etc. The development of the brain also begins with one cell. We have five roads by which intelligence from outside is communicated to the brain. These are the five senses. They act upon us in the following order and importance: 1, feeling; 2, hearing; 3, sight; 4, smell; 5, taste. Any sensation which by means of these five vehicles is communicated to the brain, leaves an impression *therein*. The first impression is that of feeling, the next that of sound. The connection of the two impressions form the first *idea* a brain ever conceives. Next comes light; the senses of smell and of taste are of inferior importance. The different impressions of feeling, sound, light, etc., leave different pictures or marks in the respective cells, the connection of which gives the child the first comprehension of consciousness of existence. The repetition of already-received impressions produces the first *reflective* idea in the brain. As more new impressions are received and others are repeated, they are stored up for future use, — *memory*. The connection of stored-up impressions with newly-

received and reflected ones, brings about what is known as *attention*. Connections of impressions formed without attention, is called *imagination;* if consciousness is disconnected from it, we say *we dream*.

We have already, as you perceive, made some progress in our little brain city. We have houses with people in them (brain cells with impressions); we have streets to connect these houses and people (thought chains); and we have some blocks of buildings (thought, consciousness, reflection, memory, attention, etc.); but our streets have no sidewalks, and are not paved; the various branches of industry and commerce are almost entirely unknown; and the houses remain in their primitive plainness, without paper upon their walls or paint upon their woodwork. The houses of this embryo city must be made to look more uniform and attractive; the accidentally-formed streets must be straightened, widened, and paved; the blocks must be properly shaped and harmoniously arranged; we must have engineers and architects (ambition and will); we must look around, travel, and give attention to the arrangement of larger cities (comparison), and by personal contact and intercourse, hosts of other travellers (outside and foreign ideas) will find their way into *our* city and make it their permanent home. We must, also, have a properly-constituted and central government, having jurisdiction over every part of the city (judgment). At this point we review our production. We inspect the houses with their inmates, the streets, the walks, the alleys, the squares, and, if we find all harmoniously working together without collision, without obstructions and breakdowns — if we find that any traveller can hurry through our city without hindrance, and without bringing or giving annoyance, we rest awhile, and say *now* we have *common sense*.

But our city has as yet afforded no luxuries. There is no picture-gallery, opera, statues of Greece or ancient Rome, or library, within its limits. There are no railroads and telegraphs to distant countries. The surroundings of the city are not surveyed and laid out, and the back country is only a primitive and undeveloped forest of darkness. These wants of our city are becoming urgent, and something must be done to meet them, though difficulties oppose themselves at every point, and in every direction. In some places our pavement was not strong enough; a heavy load broke it down, and it must be *relaid*. The people, though very clever, are obstinate about uniting in action. Some good-for-nothing vagabonds are also detected, who have to be expelled; while others, known to be useful and now wanted, must be imported. In the processes of development and improvement, factories and laboratories are erected and put in operation, the productions of which are large and various, but not good enough for the market; they will not sell. There is, however, no yielding to these discouragements, but trial after trial is made, until success is finally achieved. Success, however, brings with it no cessation of labor or relaxation of effort, until all the things of which other cities boast, are produced in our own. Attention must also be given to the surroundings; they must be laid out, — the swamps drained and filled up, — mines opened and worked, — and the various sources of wealth developed.

However strange the comparison of the brain to a city may seem, there is a striking similarity between them. Some very large cities have but one street, where everything concentrates, while the others are dirty, filthy avenues. Some brains have one brilliant thought-chain, where everything of the man's brilliancy concentrates, while all the rest is as filthy as some parts of New York. Some large cities have one busy street, while grass grows in the others; some brains fiddle constantly back and forth upon one string (idea), the rest of the brain being useless from fatty degeneration. Some cities produce but very little, and make a great display of fuss and noise if even a two-horse team is seen in their streets; so to some brains the Boston Common appears as the universe, and they themselves as the hub of it, while in reality they cannot see

daylight, though the sun shines directly upon their nose. The greater mass of cities throughout the world are of no consequence whatever, save to their inhabitants, and so it is with most of brains; they are of no value to anybody, save to the owner, — who himself is barely conscious of possessing such an article. Some cities at first appear very fine, but soon tire one to death with their sameness; is it not the same with many brains? From the appearance of a city it is not difficult to judge correctly relative to the brains of its inhabitants. Crooked streets and small houses are sure to be inhabited by crooked and small ideas. For example, look at London, Paris, Berlin, Vienna, New York, Boston, and Philadelphia, and see if there is not a striking resemblance between those cities and the brains of their inhabitants.

Improper Treatment of Children in Thought-Culture.

When a child is born its brain is not protected by nature, and is flexible, like soft wax. It, however, soon becomes safely enclosed, and is constantly constructing itself. Whoever has watched the development of a child's intellect, will have noticed how it tried to connect impressions received. Nothing can be more important than to help the child to form the thought-chains *well.* The foundation of the intellectual power of the child is laid in its infancy, just as surely as are the foundations of a city. But in what way are children generally treated?

Every mother knows that a *plant*, if it is ever to be developed according to the laws of its nature, requires rest. If you take her favorite flower-pot and shake and tumble it every day, she will raise strong and serious objections to such a course of procedure. But if you do the same thing with her baby, she is pleased; though by such shaking and tumbling you might confuse and break the already formed thought-chains, leaving them in ruins like a city after an earthquake. In fact, what child has not been tossed or rocked until stupefied to sleep? And when the poor victim made objections by crying, it was only shaken the more.

Let any person be put into a swing, and kept there but half an hour in constant motion, it will not only produce dizziness, but total unfitness for the process of thinking. Let me ask any common-sense being if there is a more stupefying and senseless manipulation than this perpetual shaking back and forth, up and down? Then comes the paregoric and the soothing syrups! No woman would give them to her dog, but her much-loved baby must take them. The very best born child is thus prepared for the semi-intellectual incapacity which we see every-where.

"Twenty-seven millions, — mostly fools," — says Carlyle, in speaking of the inhabitants of Great Britain; and the same remark might be applied with equal force to this country. Among the various causes which produce the difficulty of comprehension so widely noticed in children, there is none more prominent or effective than this shaking of babies, — this continued sea-sickness produced by a practice worthy of having its origin in the lower regions.

But, unfortunately, the difficulty does not stop here. After the child has grown a little older, it is not unfrequently trained after the manner of a poodle-dog for an exhibition; and the parents are delighted when they have taught their offspring a little trick, which the poor child is required to perform on all occasions. Is it not the smartest baby you ever saw, Doctor? asks the loving mother. And is there a man who *dare* say No? Instead of letting the child sit and creep upon the floor, learning distances, forms and colors from the dancing sunbeam upon the carpet, and listening quietly to the sounds mother nature and other circumstances provide, it is dressed up like a doll or show-baby, carried to the photographer, under the pretext of securing the likeness of the dear little one, — to various other places for like reasons, — and is kept in constant handling, for fear of soiling its clothes.

Instead of teaching the child to exercise its *reason* in reference to its strength, and learning it to profit by its failures, from the bump on the nose to the burning on the stove or in the flame of the gas or lamp, it is put into a carriage, strapped down to prevent its tumbling out, and rattled up and down the sidewalk or street by some careless and irresponsible person.

Watch a cat instructing her kittens! Every mother might learn something therefrom.

As the child advances, it is forbidden to reason freely, or discouraged in the attempt, and checked through fear of the black man, ghost, or some other nonsense, which leaves its *mark* in the brain, nevertheless.

The innocent and reasonable inquiries, — very often, it may be, above the intellectual capacity of the parent, — are answered by illogical, senseless twaddle, altogether incomprehensible to the child, and further questioning absolutely forbidden. Then it is not unfrequently prevented (and often unwisely) from selecting its own company, and thus acquire judgment, under the assumption that it might be spoiled by the neighbors' children; — in reality, because Mrs. A said something of Mrs. B's children, which Mrs. B thought was true of Mrs. A's.

Is the parent a fool? — the child is taught to speak and act foolishly, to suit the parent. Is the parent no fool? — the child is left in the hands of servants, or others, instead of being allowed to acquire reason according to instinct, inclinations and circumstances.

The School.

When six years old, the child is sent to school to learn to spell; and how? Without comprehending even the purpose of a language, the child is made to spell like a machine. To hear a school go through this thoughtless spelling, and to witness such training, is revolting to common sense. The whole, and more, of what a child can *learn* in the common schools during eight or ten years, *it could comprehend, if properly taught, in six months, at the age of twelve*, provided that the common sense has not already been shaken out of it. *Learning without comprehension, is the very foundation of stupidity.* Between reason and learning there is a vast difference.

Take the greater mass of students at college. One is a Greek scholar; another a Latin scholar; a third knows Shakespeare by heart, and any of the poets at short notice; a fourth plays chess blindfolded; a fifth can row a boat from the first of January to Christmas; a sixth is so full of eloquence, that he resembles a Niagara of learning, ready to drown a community; almost every one has a hobby of learning, which he is ready to exhibit as he did his show-tricks when a baby. But as for common sense and independent reasoning, — "mostly fools"!

Sometimes it seems as though learning and common sense excluded each other in men's brains. The truth is, that learning in a primitively confused and illogical brain, is like fine Havana cigars *planted* in the garden. A brain which has been built up crooked, can no more be mended or straightened than London can be differently shaped now. A brain with confused thought-chains is an illogical, and a brain with correctly organized thought-chains a logical brain. It is impossible for a logical brain to think illogically, and it is just as impossible for an illogical brain to think or reason logically. *In this fact lies the misery of the world.* With our present knowledge, it is no more difficult for us to lay the foundations for logical thinking in infancy, than it is to lay out cities in such manner that no future costly changes of house-raising and street-widening will be required. The basis for a logical brain is laid in the earliest childhood; if neglected, no power on earth can rectify it. No learning, no teacher or teachers can *reform* an already spoiled brain. The fact that the intellect of the small baby is not cultivated in a manner similar to that of the gardener who cultivates the young sprout of a costly plant, and that, on the contrary, its primitive thought-chains are either confused or broken by injudicious

treatment, and also, that genius and talent are believed to be born with the child, which may be developed at any time, at school or elsewhere, constitute the simple reasons why millions of civilized beings (as Carlyle expresses it) are "mostly fools."

All Children have Similar Powers of Development.

That all children (with few exceptions) are born with a similar or like genius and talent, and have like powers of development, notwithstanding the *apparent* differences in the same family, can be anatomically demonstrated.

The children of the rich almost always lack brilliancy of reason, and why? Because they were, when babies, brought up not like men, but like parrots. If we look at all the great thinkers of the present or the past, we shall find that *not one* of them was especially born, or intended as such. Their good luck or misery (as the case may be, — for it is not always lucky to reason correctly, and to think logically; for if one logically-thinking man be put among a multitude of fools, *he* is miserable, *not the fools*), lies in their earliest childhood. *Their* wit was not shaken out of them when in the cradle. They grew up by mother nature; they were taught by her more than by ignorant servants or nurses, and spoiled mothers. They were none of your show-babies, for in many instances *want* was one of their nurses. It is in the hand of every mother to produce talent and genius in her children; but she must forever discard the silly, absurd, and criminal practices of baby-tossing, baby-drugging, baby exhibitions, and parrot-teaching, and not try to improve nature's laws. It is a wonder that any common sense is left in the world after children have run the gauntlet of a year's sea-sickness from rocking and tossings; of paregoric and soothing-syrups; of the photographer and the baby-show; of vaccination, the measles, and scarlet fever; of allopathic, homœopathic, and eclectic drug-stores, with half-a-dozen M.Ds.; of the spelling-school and college, with Latin and Greek; of the poets, romances, newspapers and periodicals; of the various sensations and fashions, and of the diverse religious influences by which they are surrounded, etc., etc. Need we wonder that millions are "mostly fools"? I am sure that Shakespeare was never rocked to sleep, — to chronic idiocy. If you wish to produce Shakespeares from your babies, treat them as you do your favorite plant. Would you water your plant more than necessary? Would you shake it up twenty times a day, until it collapses? Would you put gold-dust in the pot, or simply good earth? Would you pour paregoric on it when it does not grow in winter, for want of sun? Did you ever bring a plant to bear flowers by constantly doctoring it? Use your common sense more than doctoring, with your babies, — your reason more than nursing and over-feeding; throw your patent cradle away, and let no one shake your child until stupefied to sleep. Give your child quiet and rest, for the development of thought, as you would wish to be let alone yourself when trying to think and to write. When your child begins to reason, treat it like a human, intelligent being, and not like a parrot, — a plaything, — a slave of your fancy. Remember the child belongs to the world, and not to your selfish pleasure.

Keeping Fruit in our Rooms. — We should be chary of keeping ripe fruit in our sitting-rooms, and especially beware of laying it about a sick-chamber for any length of time. That complaint which some people make about a faint sensation in the presence of fruit is not fanciful; they may be really affected by it. For two continental chemists have shown that, from the moment of plucking, apples, cherries, currants, and other fruits, are subject to incessant transformation. At first they absorb oxygen, thus robbing the surrounding air of its vital element: then they evolve carbonic acid, and this in far greater volume than the purer gas is absorbed, so that we have poison given us in the place of pure air, with compound interest. Temperature affects the rate of change, warmth accelerating it.

MORE ABOUT TOBACCO.

BY A LADY.

THOUGH neither John S. Mill nor Miss Becker has claimed the use of this drug as one of woman's privileges, yet the last few years having been an era in the history of woman's social status as well as an era in the history of tobacco, a woman claims not only to write upon the subject, but, from the very fact that she has no practical experience to guide her pen, she also claims the indulgence of the reader. For if these tobacco gleanings prove superficial — suggestive rather than conclusive — they have at least been carefully culled, and honestly and impartially arranged.

The use of narcotic drugs to lull the senses, and to dispel those fits of despondency to which man in all parts of the world is subject, would appear to be of great antiquity.

If we except the *nepenthe* of the ancient poets, to Indian hemp (*Cannabis Sativa*) may, perhaps, be traced the earliest record of this species of indulgence, though some writers suppose that tobacco itself was not unknown in pre-historic times. Herodotus describes the Scythians as burning Indian hemp on hot stones, under a tightly closed tent of woollen felt or fleece, and inhaling the fumes until they became "transported with delight," or, as another translator has it, until they "howled aloud for joy." The Chinese claim to have been smokers for many ages. Meyeu, a traveller in China, speaks of sculptures on which he observed the same kind of pipe as that now in use; but the precise age of these monuments is not proved, and the pipes may have been used for opium smoking. However inseparable from the eastern picture of our day are the narghile, the hooka, and the chibouk, their seems to be no well authenticated evidence, either from oriental writings or from ancient monuments, that any instrument answering the purpose of a pipe was in use among the ancients. How long smoking had prevailed in the new world when it was discovered, we have no means of ascertaining. Wilson affirms that "the practice of smoking and burning the leaves of the tobacco plant, reveals itself among the remotest traces of human arts in the new world;" and that nothing more clearly proves its antiquity than the "totally distinct and diverse names by which the various tribes designated it." While in the eastern hemisphere tobacco is used merely as an indulgence, among the aborigines of the new world the pipe was held in religious reverence, and was "intimately interwoven with their rites and superstitions," and probably "filled the place of the golden censer in the gorgeous rites of pagan and Christian worship." The vast numbers of relics of elaborately carved pipes found about the ancient altars are strongly suggestive of the sacred significance of tobacco smoking, even perhaps its origin. Under the Mosaic dispensation, the burning of incense in expiatory sacrifices bears some analogy to the propitiatory pipe of the Indian tribes; and as ethnologists have traced the Mongolian type in the Aztecs and other extinct races of America, it seems not unreasonable to assume that this peculiar feature in religious ceremonials may have had one common origin.

Prescott also mentions the universality of the sacred pipe among the Indian tribes from the extreme northwest to Patagonia; and it has been well authenticated that the Aztecs astonished the Spaniards by their use of tobacco, smoking cigars and highly embellished pipes, and taking snuff after the fashion of modern times. Columbus also found the Cubans with "rolls of dried herbs in their mouths," and was "astonished as well as disgusted" to see the aborigines inhaling tobacco smoke through their nostrils from a forked pipe in the form of the letter Y, "until they fell to the ground

insensible." The name of this instrument was called a *tabacos*, the same as that applied to the sheath of maize or envelope in which the Caribbeans wrapped the weed: hence most probably, its European name, tobacco; though others are of the opinion that it was called after the island of Tobago, where Columbus first found it, or from Tabaco, or Tabasco, in Utacan, where the Spaniards first used it.

Whether the present use of tobacco can be traced beyond the fourteenth or fifteenth centuries or not, it certainly now prevails in every habitable part of the globe; and where tobacco is not easily attained, a substitute has been found. Thus the Peruvian Indians chew the coca leaf, and attach to it the same religious reverence which the northern tribes do to tobacco. In Malacca, Cochin China, and some of the East Indian islands, the Penang or betel-nut is in such general use for chewing that a box to contain it is an essential article of furniture, and a case for it slung to the belt is a common appendage to the dress; as in China, where all classes and both sexes smoke, a silken pocket to contain the pipe and tobacco is an ordinary article of dress among young girls. In many parts of Central and South America, as well as in Oriental countries, smoking is common with both sexes from an early age. In the Philipines, preparations called *siri*, *ganga*, etc., etc., and *buyo*, are chewed by man, woman, and child. Every one carries a case of *buyos* in his pocket, and offers one to the stranger; as in Manilla, they offer a cigar. The *buyo* is made of the betel-nut, or of a root having the same properties, pulverized with a sea shell containing a strong alkali, dried in the sun and then rolled in a buyo leaf, cheroot fashion. In some of the islands the betel-nut, sprinkled with *chunam* or shell lime, and wrapped in a leaf of the red pepper plant, is chewed in the same manner. The alkali is to correct the acidity of the nut, and the red pepper leaf counteracts the impoverishing effect upon the blood. The betel-nut tree has been naturalized in Jamaica, where its properties for chewing are in growing esteem. The modern Arabs not only smoke Indian hemp under the name of *haschische*, but chew the betel-nut and a plant called *kad*. There is also a plant called *guncha*, which is grown abundantly for consumption in Siam, and which possesses many of the intoxicating properties of opium. When smoked, its effects are at first exhilarating, and followed after three or four hours by a deep sleep, ultimately producing diseases similar to those created by the inordinate use of opium; of which, independently of the *guncha*, there is in Siam an amount to the value of £150,000 sterling annually consumed. So impossible was it found to arrest the evil of opium smoking, that in spite of the King of Siam's decree, in 1839, the drug has since been legalized and its growth permitted. From the flowery and magniloquent decree alluded to, one concludes that "His most gracious and sublime Majesty, the King of Angelic Siam," was himself proof against the fascinations of smoking; for "from the time that his Majesty ascended peacefully, to rule the kingdom, ... he, being endowed with very much sublime and exalted compassion," . . . did "perceive that opium was a thorn in the bosom of the divine religion of Budda and of the angelic country." Therefore the King — the God Budda being at the head — did "with solicitude exercise his divine mind to silence and cut off opium;" and having "graciously condescended to the tuft of hair of the head with grace to the head," commanded the royal servants to clear away the opium concern out of the exalted and angelic cities, . . . and inflict punishments on all who," etc., etc., . . . so that "opium, being all gone, the thorn in the bosom of the land will have been removed entirely;" and so forth, and so forth, to the extent of several pages. A similar effort to check the use of opium was made in China, but so ineffectually that the cultivation has been since permitted; and, to the lamentable displacement of grain crops, carried out

to a ruinous extent. Thunberg, in 1771, found the Hottentots cultivating hemp especially for smoking, they finding tobacco not sufficiently strong, and therefore mixing with it hemp-seed chopped very fine.

One of the most fearful consequences of the immoderate use of hemp-seed and opium is a peculiar species of madness, called, in Borneo and the East, *amok*. It is an uncontrollable and passionate frenzy, similar to delirum tremens. The victim to this rash indulgence becomes a terror to the community. He rushes frantically at whomever he meets, brandishing a weapon, and shouting, *Amok! Amok!* — ("I'll kill you! I'll kill you!") Men, women and children flee in all directions as from an enraged tiger, until, in self-defence, the madman is shot down like a wild animal. The common expression among sailors, "running a-muck," is derived from the reckless furiousness of this *amok* madness.

It is remarkable that, however rigorously the smokers and snuff-takers of the sixteenth and seventeenth centuries were dealt with, tobacco owes its first introduction into Europe to its reputed medicinal virtues. "*Panacæa*, divine tobacco," was Spencer's designation of it. But in spite of anathemas thundered at it, in spite of a whole battery of fines and penalties, and the combined eloquence of divinity, law, and physic hurled against tobacco, smokers have not only puffed away defiantly, but Nicotiana has won votaries exceeding those to be numbered at any shrine in the history of the human race — and this within a period of about 300 years. Let us follow her introduction and reception in the Eastern Hemisphere.

In 1560, Jean Nicot, an agent of Francis I. of France to the Portugese settlements of the new world, procured some seed from Florida, and presented it to the Queen. Through the French court tobacco became known throughout the Peninsula; a manufactory at Seville early establishing the reputation of Spanish snuff — for in this form tobacco was at first chiefly used. Snuff-taking grew to be so fashionable an indulgence, and its accompaniment — sneezing — so inharmonious in the services of the sanctuary, that Pope Urban VIII. was compelled to issue a bull excommunicating all those who should take snuff in church. In England, tobacco smoking having meanwhile been introduced by the popular favorite, Sir Walter Raleigh (who used to sit at the door of the "Pied Bull Inn," Islington, and at a goldsmith's shop, in London, and smoke "the newly-introduced weed," to the great astonishment of the passers-by), it was reckoned the fashionable thing among the wealthy; and, during Elizabeth's reign, met with no great opposition. Not so, however, in the North of Europe, where Christian IV., of Denmark, inflicted heavy fines upon smokers; and in Russia their noses were cut off — the Grand Duke of Muscovy going so far as to hang the offenders. Meanwhile, tobacco was introduced into Africa and Persia, by the Portuguese, and thence, as some suppose, to India and China; and, during the first part of the seventeenth century, smoking became at once so popular throughout Southern Europe and the East, that the severest punishments were impotent in checking it. The traveller, Sandys, describes the habit of smoking as new to the Turks in 1610. They "took it in reeds that have joyned to them great heads of wood to containe it." But the Turks could enjoy it only on the sly. "They took it in corners, and were glad to procure what the English considered unsaleable," the Sultan Amuret having decreed that all smokers and snuff-takers should have their noses cut off. The Grand Vizier had pipes thrust through the noses of smokers, and thus had them led through the streets. Mahomet IV. punished smoking by death; the Shah of Persia had noses snipped and ears cropped in vain; and James I. did his utmost in the way of fining, writing, and legislating, to restrict the importation, the cultivation, and the use of tobacco in England. All tobacco crops were, by his orders, to be rooted up; "for," wrote the royal

pedant, "it is less intolerable for tobacco to be imported among other superfluities from beyond the seas, than that the soil of this fruitful kingdom should be misemployed and abused in the cultivation of it." Until Virginia was colonized, all the tobacco imported was raised by the Spaniards in the West Indies; and upon that James levied a tax of, at first, 2*d*. per lb., afterwards increasing it to 6*s*. 10*d*. per lb.

When — *cir*. 1616-20 — the new colony of Virginia began to abandon other manufactures for the cultivation of tobacco, James, not daring to prohibit it entirely, enacted that no planter should raise above one hundred weight *per annum;* and in the latter part of his reign a law was passed that England should be supplied solely from the American colonies. Doubly hateful was the obnoxious pipe to this monarch of fastidious tastes and impoverished coffers. "Some of you do bestow £300, some £400 a year upon this precious stink," he protested. "Ye do make the filthy smoke and stink thereof to exhale across the dishes and infect the air;" for, to his infinite disgust, the pipe was lighted even at dinner-time. "The stinking fumes thereof do nearest resemble the horrible Stygian smoke of the pit that is bottomless;" and a great deal more in a similar strain wrote the king, who, says Thomas Ingoldsby, Esq, —

> In quilted doublet and great trunk breeches,
> Held in abhorence tobacco-smoke and witches.

Cromwell endeavored, no less vainly, to check smoking, and sent his soldiers to search out and tread down all tobacco fields. Stow called it "a stinking weed much abused to God's dishonor," and says it was indulged in by most men and many women; and Evelyn testifies that at Cromwell's funeral — "the joyfullest he ever saw" — the soldiers smoked all along the streets in procession. The Japanese fills his little pipe every five minutes, and even gets up in the night to take a few whiffs and sip his tea.

Tobacco belongs to the nightshade family of plants (*Solanaceæ*), all of which are poisonous; the deleterious qualities residing in the oil called nicotine. Stupefaction is one of its effects; thus tobacco is used to drug inferior porter.

In Florida the plant was called *petun;* hence our petunias, one of the tribe. The great authority, Dr. Asa Gray, and other American botanists, record only two indigenous species, *nicotiana tabacum*, or Virginia tobacco, and *nicotiana rustica*, both said to have been advanced from tropical America, and probably undergoing still further variations from climate and cultivation; as the Maryland tobacco differs from the Missouri species, and that, again, from other kinds cultivated by the Indians of the far west. Now Virginia tobacco being inferior to that grown in Cuba, and the *nicotiana rustica* of northern climates being inferior to the Virginian species, we may conclude that, as a general rule, tobacco deteriorates northwards; and, as there are now fifty recognized species in various parts of the globe, the interesting question remains — Have climate and cultivation produced these scientific distinctions since the naturalization of the original species from tropical America? or, did tobacco exist in Persia, Tartary, Africa, and the East Indies, previous to the discovery of America?

Certain recognized and individual qualities in the various species render them of more or less marketable value, and are turned to practical account by the manufacturer. Thus the Havanna and Manilla tobaccos are more elastic and leathery, stretching immensely, and are in virtue of these qualities used for the outside covering of cigars. Dutch tobacco is pale — not full-flavored; is more porous, or "drinky," and in fact is bad enough to be used to adulterate the choicer kinds. In a large factory in the north of England, where adulterating ingredients were suspected, the visitor was told that "cabbage and dock leaves would be a luxury to that Dutch tobacco." English tobacco is *nic. rustica*, the same as that grown in Turkey, and known as Turkish tobacco; and *nic. Persica* is used for the famous Shirag tobacco, a mild kind much esteemed in the East.

In manufacturing, the commoner kinds require to be heated (half baked) to bring out what flavor they possess; other kinds, like those from Virginia and Cúba, have flavor enough and to spare. Within a few years English manufacturers have been permitted by Act of Parliament to use certain ingredients heretofore considered adulterations in the flavoring of tobacco; and among others the reader of the *Tobacco Trade Review* may see various wines and essences advertised as "Patented," "Analyzed," such as *prune wine*, for instance, which is "found to be of the choicest quality of foreign wines, with other costly fluids among its ingredients." A glance at this *Review* will show with what jealousy a monopoly of such flavoring is secured by certain manufacturers; and with what skill they cook up the raw leaf in order to entice the epicure. "We no sooner bring out a new cigar than it is imitated in bad leaf by unprincipled houses," writes a victimized inventor. Then the advertisements! "We are now making a very beautiful cigarette in blue, green, buff, mauve, and pink satin paper, superior to Vevey Fins,"—whatever they may be (?) "We have a few handsome boxes of bright cavendish, got up in American style—a capital article for Christmas presents." "Our new smoking mixture," etc. "Observe our trade mark." Excepting the legalized flavorings, adulterations are visited by the heavy penalty of £200, in spite of which chicory, rhubarb, colt's-foot, and other leaves do somehow get insinuated occasionally among the choicer kinds of tobacco, whose excess of flavor might otherwise prove too potent for both pipe and pocket, perhaps.

Besides the immense duty on imported tobacco, the merchant will tell you he sustains an annually increasing waste in the *per centage* of stems, which he can only dispose of to the snuff-makers, and which, owing to the consumption of snuff being less every year, become in proportion less and less marketable. The duty on unstemmed leaf is from 3*s.* 2*d.* to 3*s.* 6*d.* per lb., and the stems when detached are worth only 2*s.* 6*d.* a lb.; consequently, to escape duty on what may prove a dead loss, the manufacturer permits the chief stems, or "buts" of the bunches to be chopped off at the custom-house before the mass is taxed, and these stems are burned by Government authorities. Every cask undergoes rigid examination at the bonding warehouses, and all the injured or forfeited tobacco is destroyed. Stringent legislation and legal restrictions still hem in the tobacco trade, or the revenue would materially suffer. During the late war between Prussia and Denmark, a ship-load of twelve or thirteen hundred tons of tobacco stems was being sent from Germany to Denmark, and on putting in at Hull for repairs, the tobacco, though not intended for England, was seized by the revenue officers there (the importation of stems alone being prohibited in England), and the whole cargo was burned in a field near the docks. At the London docks is the huge kiln popularly known as "the Queen's tobacco-pipe," in which all injured, waste, or contraband tobacco and cigars are periodically burned. Occasionally many hundred-weights of tobacco and cigars, as well as other forfeited valuables, are here stupidly consumed, which had far better be sold in aid of some of the national charities.

Tobacco is shipped to England packed in various ways—from South America in linen bales, and from the United States in hogsheads, each containing an average of ten or eleven hundred weight, but by immense pressure so closely stowed that one thousand pounds is forced into the compass of a barrel four feet high and two and a half feet in diameter. For the convenience of unpacking, the barrel is sawn in two, and the solid mass of tobacco has to be carefully separated. The contents may consist of entire plants in bunches, or of detached leaves folded and laid flat one upon another. You may see in a tobacco factory a score or more varieties of growth, of curing, of packing, and of color, and these are again diversified in endless ways in preparation for the market.

In proportion to its value, no other imported article is subject to such a high rate of duty as tobacco; but this, as it

is a luxury only, and not a necessity, is only *fair*. (At least so thinks a woman, who must endure but not enjoy tobacco.) The intrinsic value of the raw commodity is from 3*d*. to 10*d*. per lb.; and of manufactured tobacco from 3*s*. to 5s. per lb.; while the duty alone is from 3*s*. to 3*s*. 6*d*. per lb.

The duty on raw tobacco has gradually advanced since 1787, when it was raised from 10*d*. to 1*s*. 3*d*., having remained nearly at the present rate since 1825. The enormous sum of six millions sterling is now added to the revenue by the duty on tobacco. Six millions of golden sovereigns annually! What a homily could be read on the fact that millions of human mouths are hourly engaged in the stupendous work of producing *smoke* at so vast a cost!

But leaving the moral to the conscience-struck reader, and keeping to facts alone, statistics prove that smoking is a steadily increasing habit — the annual comsumption of tobacco more than keeping pace with the population. In 1791, the quantity of tobacco consumed in England was about 9½ millions of lbs.; and in 1841 it was 40 millions of lbs.; — averaging 13½ oz. per head: at present the average is nearly 1½ lb. per head.

This growing habit of smoking has, of late, given rise to much scientific controversy as to its physically injurious effects; but, after all is said, we are left to suppose that if the friends and foes of tobacco were ranged in opposite ranks, they would present two such equal and well balanced parties, that a drawn battle must be declared. To render this paper more complete, a few well-known authorities shall be impartially quoted, and the victory between my two moral battalions left to the reader.

To youth, the entire faculty concur in denouncing tobacco as *positively injurious*. Dr. Decaisne, in the *British Medical Journal*, states that in twenty-seven out of thirty-eight boys, between nine and fifteen years of age, who smoked, he observed distinct symptoms, consisting of functional disorders, slowness of intellect, and a taste for strong drinks. Facts which are again proved in the competitive examinations at public schools, where the habitual smokers are generally found to be below par. Dr. Richardson, who has bestowed such careful attention to the subject, says that "before full maturity of the system is attained, the smallest amount of smoking is hurtful."

Every species of tobacco, however variously prepared, possesses certain deleterious qualities in common.

These are carbon, which settles on the membrane of the throat, and produces what is known as "the smoker's sore throat;" ammonia, inducing thirst and frequent quaffing; carbonic acid, and the oil of tobacco called *nicotine*, "a sedative poison which exerts an influence through the blood upon the tissues of the heart itself," producing functional disturbances of the heart, the brain, the stomach, the nerves, and incipient diseases of many kinds. Sir Benjamin Brodie was inclined to think tobacco, used immoderately, was more injurious than opium; but those who have witnessed the terrible effects of the latter, where immoderately indulged in, adduce strong proofs to the contrary.

From the internal appearance of a man who had died from apoplexy not long since, Dr. Lankester judged that he had been a drunkard; and on learning to the contrary, "but a great smoker," remarked that "if alcohol and tobacco were to be tried for murder, alcohol would be hung, and tobacco get off with a week's imprisonment."

Cigars produce dyspepsia more rapidly than the pipe; because, without a long mouth-piece, the *nicotine* is necessarily absorbed. Of all the uses of tobacco, *chewing* is admitted to be the most injurious, as well as the most odious, and it is a habit which seems to have stamped a nationality on the conventional "Yankee," with his spare form and sunken cheeks. Yet sailors chew immensely — a habit which has probably grown out of the severe rules for restricting fire on board ship — and the figure of the conventional sailor is exactly the reverse of that of the typical Yankee; from which fact we can only

argue that the injurious effects of tobacco-chewing are greatly obviated by the active, open-air life of the sailor. Some chewers dispose of from four to eight ounces a day! A case is recorded of a sailor, sixty-four years of age, and of uninterrupted good health, who had chewed for fifty years, latterly *eating* his quid, swallowing every particle of leaf and juice to the amount of a quarter of a pound every five days. Regarding tobacco, as regarding other evils and their remedies, the doctors differ in some respects. For instance, while some affirm that tobacco produces the weakened vision, and the ear-ache, the well-known Dr. Osborn, of New Orleans, records a case where otalgia was cured by tobacco; and extols it as a valuable remedy, internal or external, in several diseases; the pharmacopœia also attests to its various uses. "Tobacco, used with judgment and moderation," wrote Fagon, the famous physician of Louis XIV., "may justly claim the precedence of all other remedies. It makes us forget the cares of life, renders us happy in extreme poverty, eases our mind, and even supplies the want of victuals." *Moderation* and *discretion*, then, end the argument. Just as sweets or acids or bitters are poison to one man and life to another, and as too much of any good thing negatives its virtues, so must the judicious smoker regulate his pipe.

"Tobacco!" exclaimed Sir Walter Raleigh —

> It passes the time, improves the joke,
> And turns all troubles into smoke!

Friend alike of savage and civilized man, of prince and peasant, bond of fraternity, a freemason signal of good will and fellowship — when woman is told all this of the magic pipe, might she not almost envy this boasted means of obtaining a little tranquil enjoyment in this untranquil world?

Philosophy comes to our aid. "When your husband gets into a passion, fill his pipe for him. With that in his mouth he cannot go on quarrelling," writes one who has, doubtless, found that a cosy nook where her lord and master can smoke in peace, is the best means of keeping him at home. "See his face relax by degrees. By the time the pipe is out his passion will have exhausted itself, and the promise of a new bonnet will in all probability ensue." The victory of tobacco must be recorded among the great events of the middle of the nineteenth century. Church and State have succumbed to Nicotiana. A few years ago, if our clerical cousin were caught with a cigar in his mouth, what confusion he would betray, what apologies he would offer, what excuses in behalf of his over-worked brains, or the efficacy of a cigar in warding off infection "while fever is in the village." Clerical or not, who ever offers an excuse for smoking now-a-days? The "occasional cigar" is supplanted by the constant pipe. Majesty itself has surrendered to Nicotiana; and in royal residences, where not long since smoking was forbidden, a smoking-saloon is now acknowledged to be indispensable. The ear legislative has been won for Nicotiana, and the whole army of railroad directors compelled to raise a flag of truce in its favor, and to set apart a smoking-carriage in every train on every line. On the contrary, where least expected, we find some lingering struggles to keep Nicotiana in check; for a resolution was lately passed in one of the great religious conferences in the United States, that any person using tobacco was not to be admitted to the ministry.

Ladies, Just Think. — We clip the following from *The Richmond Evening News*: How astonished some of our fashionable ladies would be if a certain law passed in England, in 1770, just a century ago, were re-enacted! "Any person who shall, by means of rouge or of blanc, of perfumes, of essences, of artificial teeth, of false hair, of cotton Espagnol (whatever that may be), of steel stays or hoops (the crinoline of 1770), of high heeled shoes, or of false hips (can such things be), entice any of his Majesty's male subjects into marriage, shall be prosecuted for sorcery, and the marriage shall be declared null and void." What glorious help this law would give to the divorce courts!

CHINA DISHES.

OLD china is found everywhere; our grandfathers and grandmothers delighted in punch bowls, egg-shell tea-cups, and porcelain monsters: and now every museum in Europe contains numerous specimens of china-ware which serve, when a hundred or a thousand years old, as the best models which can be set before the pupils of the ceramic art; but dishes and bowls are intended for use as well as show; and as ours is a journal of the useful and agreeable, though not of the *beaux arts*, we shall say a few words about what china dishes sometimes contain.

We have no intention of writing a dissertation on birds' nest soup, curried rat, or roast puppy; these are stale curiosities, although they have not yet taken their places on our tables. Our object will be to cull a few less hackneyed necessaries and luxuries.

The Chinese method of bread-making is curious: the flour is mixed with water, and the dough rolled by hand, and then shaped into cones, which are placed on trays or stands made of split bamboo, and cooked in the steam arising from cast-iron boilers; of course such bread resembles our own but little, being a good deal like a steamed hard dumpling. Much of this bread is made of maize; but wheat bread is much preferred. Rice, however, is the common bread of China, and the Chinese know how to boil it, which is not often the case in Europe. This is cooked much in the same way as the bread, being first washed very carefully in several waters, then placed in bamboo baskets, and suspended in the steam; or it is boiled for about half an hour, and then put into a bamboo basket, and not served until nearly all the water has drained away; but in whichever way it is cooked, the grains are distinct.

Peas pudding is not a luxurious or very expensive dish; and the Chinese have what they call pea-cheese, which holds much the same rank; it is a very cheap and useful article of diet, prepared from oleaginous peas, which are also eaten as vegetables, and from which a rather expensive kind of oil is made. The making of this cheese, although a simple operation, requires considerable care; the peas are first steeped in water for twenty-four hours, and are then drained in a basket; they are then ground in a hand-mill composed of two hard stones, the upper having a hole in the centre through which the mill is fed, like a baby, with a spoon, the water in which they have previously been, being added from time to time, so that the peas leave the mill in the form of a thin paste, which is placed in a filter, and kept constantly agitated by hand; the filtered liquid is boiled very slowly in an iron vessel, and presently becomes covered with a thick scum; it is then turned into a wooden vessel to cool; and, after being stirred about for some time, a pellicle is formed, which is carefully taken off with a wooden ladle and then drained; and this is eaten either fresh or dried, and has somewhat the flavor of new cheese. This is not, however, the pea-cheese, which is made from the liquid in the vat; but a small quantity of water containing plaster is added, and a few drops of concentrated solution of salt obtained from the saline marshes; the plaster has the effect of coagulating the caseine of the peas, and the whole mass, after being slightly stirred, becomes solid. The cheese they produce is put in wooden frames about 15 in. square and 2 in. deep; and these are placed on a stone to drain, with a piece of linen of close texture below each frame; when sufficiently drained, the cheese is compressed, by means of pieces of wood loaded with weights, to about half its original thickness, and is then packed in boxes, and often sent great distances. The cheese will not in its natural state keep more then a day in hot weather; but is often salted and otherwise preserved, so as to keep good for years. A lump of it as big as a man's fist does not cost more than a quarter of a cent. The poor Chinese also drink the

liquid before it is coagulated, and the cheesemakers' shops are constantly filled with crowds of customers. Pea-cheese forms one of the staple goods of the country, and is highly nutritious. When fried in oil or grease, like potatoes, it makes a very delicate dish. Dry pea-cheese contains about 24 per cent. of fatty, and 8 per cent. of azotized matter.

The Chinese and Japanese produce gelatine from a marine plant, *grateloupia filicina*, to which the name of *gelose* has been given by the French chemist, M. Payen. The plant is washed many times in water, and bleached by exposure to the sun and dew; it is then washed again, and again laid out to bleach, and these operations are successively repeated until the required color is obtained; finally, it is cut in pieces, boiled for a long time, and squeezed violently in a linen cloth. The liquid thus produced is placed in moulds, and evaporated to dryness in the sun. This gelatine is used to make jellies, and also to thicken dishes; and it is also cut up into small pieces, and put into soup, like toasted bread, before serving.

Besides ordinary sugar, the Chinese prepare sugar from germinated wheat and rice; this glucose is called gelatine sugar, and is used in making barley-sugar and other sweatmeats; it resembles manna in appearance, and enters into several pharmaceutical preparations. With this glucose, raw sugar, etc., the Chinese manage also to make an imitation of honey, which deceives most people.

The Chinese are very fond of eggs, and have more than one method of preserving them, the most common being to place them in a mixture of clay and water, and then allow them to dry in the sun, so that the clay forms a hard crust around them. But the following is the mode of preparing eggs for Chinese *gourmands*. The eggs are each covered separately with a paste composed of tea, quicklime, sea salt, and oak ashes, then rolled in rice straw ashes, and packed in boxes with masses of rice to keep them from touching each other. They remain thus packed for three months, when they sell for about two cents each. They undergo a curious transformation; the yolk has turned green, the white has coagulated, and they emit a very strong sulphurous smell, yet the Chinese consider them delicious! Well, who has a right to laugh at them, — those who eat raw oysters, snails, high game, or decayed cheese?

We conclude with the copy of the bill of fare of what is called a regular mandarin supper, given by Sir Charles Macdonnel, at Hong Kong, in 1867, to the Duc de Penthievre, the Comte de Beauvoir, and some other French gentlemen: — "Preserved fruits; fish roe in sweet caramel sauce; almonds and raisins; shark fins in gelatinous sauce; cakes of coagulated blood; hashed dog, with lotus sauce; birds' nest soup; lily seed soup; whale nerves, with sweet sauce; Kwai-poh-Hing ducks; sturgeons' gills in compote; croquettes of fish and rat; sharks' fat soup; stewed sea-snails, with tadpoles; sweet dish composed of fish fins, fruit, ham, almonds and essences; lotus and almond soup as desert; with medicated wine and warm arrack. The mixture sounds curiously to American ears, yet the Chinese have the reputation of being great epicures.

Paris Industry, — In the shape of advertising and puffing, is on the increase. The latest "idea" is that contained in an advertisement which runs as follows: — "Madame X X permits herself to say (idiom) that she has the skin white to pearls, full health, the cheek of roses, face of sweet expression, blue eyes and black hair, and a coquette figure — therefore is full of health; she will be vaccinated next Tuesday, and in as short a time as possible the lymph of her arm will be ready for the vaccination of any one desirous to possess a purely healthy vaccination. For terms, apply," etc. etc.

If there are Quacks who seem to stand up high, it is simply on account of the numerous Flats around them.

ON FASTING AND FASTING PEOPLE.

IT was generally supposed that people living in the nineteenth century had forever discarded the supernatural; but the case of the Welsh girl, which has lately terminated in so disastrous a manner, leads us to suppose that there is still a section of society (and apparently a very large one) that is easily inclined towards the extraordinary rather than common sense. The miserable part of the Welsh tragedy was, that it was taken out of the sphere of action in which most of these incidents appear, viz., the credulous and ignorant orders of society, and transferred into a semi-scientific class, which, by its proceedings, gave it an air of serious mystery, as though English people really believed in it. Whether from sheer stupidity or mistaken orders the unfortunate child was starved to death, will probably never be known; but, in any case, it is a grievous slur upon the common sense of that Carmarthenshire neighborhood. In almost every case that history records of extraordinary fasting, a very cursory examination refers them to the same causes, which are generally permanent aberration of intellect, or such derangement of the system arising from disease, that the mind becomes affected, together with the body. Hysteria is, of course, the most prominent cause amongst women; and as this malady is a perfect Proteus for simulating other maladies, it renders the case correspondingly difficult for the physician to detect. But, at the same time, there is no doubt but that cases of fasting occur quite independently of hysteria or any mental aberration whatever; for children of so young an age have been recorded as subsisting without food, that the source of trouble must have been some physical malformation. It is stated, for instance, that a child was born in 1761, at Grenoble, who, originally healthy, had a long illness when he was about eight years old, and recovered from it, save that he could not be brought to eat food for more than a year. Notwithstanding this, he kept his strength so far as to follow his usual work of taking the laborer's dinner to the fields, although his dimensions shrank away to nothing. Then, again, there is the case recorded in "Hone's Every Day Book," of the French Living Skeleton exhibited in England, who certainly had nothing hysteric about him, but from early childhood appeared to exist as though only to show how very like death a man could be and live. His diet was never anything more than a biscuit, which took him the best part of the day to eat.

Besides these malformations of nature, cases may arise where determination, backed up by considerable strength of mind, may so far act as to bring the wants of nature into conformity with the will. For instance, a man living near Stamford, England, in 1771, made a heavy bet that he would live for seven weeks without anything solid; and, although he was exceedingly hard pressed, he won his wager, living the whole time on drink alone. Another man, who had considerably more method in his madness, was a miller in Essex, much addicted to corpulence, and a notorious glutton, which perhaps may account for it. After several years of high feeding, he felt very ill, and became a confirmed invalid, till one day a friend put into his hand a book by a foreign writer named Cornaro, from which he perceived that excessive eating was the cause of his complaint. He at once diminished his food to such an extent, that between June and October, 1765, water was his only drink. From October to the next May he only took two and a half glasses of water even; and on the 31st of July in the same year he left off all meat, living on nothing but biscuit pudding. This heroic treatment so far prospered, that he is said to have regained all his former health and strength. In a very interesting recent paper in the *Medical Times*, it is stated that the Trappists have but one meal a day in winter, and two in summer; and that, when they come

back to their winter arrangement, they scarcely feel any sensation of being deprived of their usual supply after the first fortnight or so; but when, on the other hand, they return to summer regimen, they experience uncomfortable sensations of fulness and flushing. The writer points out that this is a useful caution for people who have any tendency to congestion of the head or skin diseases of the face, and that they should be particularly careful to have their meals at regular times. The Trappists are allowed no meat, fish, butter, or eggs; yet their health is good, gout and indigestion are unknown, and scurvy is never heard of. These, of course, are not cases of pure fasting; but they show how much, under certain circumstances, the stomach may become habituated to fasting, and, perhaps, rather to like it than not. In the "Academy of Sciences Reports" (Paris) it is narrated that Christina Michelot, aged ten, and daughter of a vine-dresser at Pomard, fed upon nothing but water; whereupon a benevolent lady in the neighborhood took her to her house and experimented on her by substituting, surreptitiously, very clear, strong veal broth instead of the water. It was no use, however; the veal broth was wasted, and the child went into convulsions.

Religious enthusiasm is often a very strong element in fasting cases. We may instance St. Simon Stylites, who ate nothing during the six weeks in Lent. Dr. Honigberger relates that a Fakir permitted himself to be buried in a vault sufficient time to allow of seed sown at the time to come up and sprout into leaf; while a well authenticated story is told of another Fakir, who, "for a consideration," would die, becoming apparently breathless and pulseless, and remaining in that state for many days. A man at Haarlem, who had become crazy from some family troubles, announced that he was the Messiah, and must fast forty days, which he really did, tasting nothing but a drink of water and a fair allowance of tobacco smoke. This, although it could not have nourished him, might exercise some narcotic influence on the pangs of appetite. The Dutch appear to have been rather prolific in fasting cases, for several of them are mentioned in various writings. In 1589, lived Katherine Cooper, who for five years did not eat or drink, although we are told, curiously enough, that during the whole time "she learnt her Catechism and willingly frequented sermons." Her story is told in "a Notable and Prodigious Historie of a Mayden who, for sundry yeeres, neither eateth, drinketh, nor sleepeth," printed from the Dutch, in 1589.

In England the most celebrated cases are those of the fasting woman of Ross-shire and the woman of Tutbury. There lived in the parish of Kincardine, in the last century, Catherine McLeod, who, after a long fever, appears to have fallen into a low bloodless state. She could not hold up her eyelids, and she became unable to use her limbs. For a year and three-quarters nothing passed down her throat, but at the end of that time she suddenly called out for a drink of water, which disappeared with great facility. Pennant, the old topographer, paid her a visit, and says that her neck was contracted, her chin fixed to her chest, and her forehead wrinkled, but that her cheeks were blooming. This latter appears to be a concomitant of starvation diet. Ann Moore, of Tutbury, lived in the present century, about 1813; and though she began to starve herself because she liked it, she kept it up because she found it very profitable. Unfortunately for her, when she had carried it on for four years, to her great advantage, a conclave of medical men established a strict watch, and after nine days she gave in, and confessed her imposture before a magistrate. So strong, however, was her desire of deceit, that even when the physicians declared she could not survive another hour, she took a solemn oath that she had touched nothing for four years. Miss Moore evidently thought, at last, that a living dog was better than a dead lion, and it is a pitiful thing that the poor little Carmarthenshire girl was not allowed to think so before it was too late.

NOTES FOR FAT PEOPLE.

THE Medical profession in general do not seem to have a very clear perception or knowledge of the causes and cure of obesity as a disease; or otherwise, from a scientific basis effective remedies would ere this have been applied. On the other hand, the public, while almost without knowledge on this subject (and how should the people have knowledge where their teachers are ignorant), appears to have little or no sympathy with or appreciation of the real condition of the unfortunate sufferer, or otherwise the injudicious remarks, and sneers frequently painful in society, and which even on the strongest mind have an unhappy tendency, would be withheld. When a corpulent person eats, drinks, and sleeps well, has no pain to complain of and no particular organic disease, the judgment of some of the ablest medical men seems to be paralyzed. In too many instances they seem to regard this disease simply as the natural result of increasing years, and prescribe as the remedy, in addition to a little medicine, more bodily exercise, — less sleep, less food, vapor and Turkish baths, shampooing, etc.

Corpulence, although giving no actual pain, presses with considerable force upon the abdominal and other viscera, and hinders, if it does not wholly arrest the freedom of action. Nor is this the only evil: for by the development of adipose or fatty matter in the throat, it may, by pressing upon the eustachian tubes, stop them up, and thus produce deafness. Fatty accumulations, also, in some cases affect the eye and sight, and in others interterfere with and lessen the muscular power of the heart. It must therefore be obvious that obesity is not only an uncomfortable burden, but in some cases, at least, a very serious disease; and the question naturally arises as to its causes and cure.

In the processes of digestion, starchy food is largely changed to sugar, and sugar to fat; hence the principal causes in connection with nervous and mental inactivity which tend to corpulence, especially in advanced life, may be found in an excessive or over use of those articles of food which contain starch and sugar. In the cure of obesity, common sense would therefore most clearly indicate, that all fat-producing articles should be withheld from the diet of the patient, and that nervous and mental activity should be largely increased. The following, on this subject, is from the pen of Wm. Harvey, F.R.C.S., England.

"When in Paris, in the year 1856, I took the opportunity of attending a discussion on the views of M. Bernard, who was at that time propounding his now generally admitted theory of the liver functions. After he had discovered by chemical processes and physiological experiments, which it is unnecessary for me to recapitulate here, that the liver not only secreted bile, but also a peculiar amyloid or starch-like product which he called glucose, and which in its chemical and physical properties appeared to be nearly allied to saccharine matter, he further found that this glucose could be directly produced in the liver by the ingestion of sugar and its ally starch, and that in diabetis it existed there in considerable excess. It had long been well known that a purely animal diet greatly assisted in checking the secretion of diabetic urine; and it seemed to follow, as a matter of course, that the total abstinence from saccharine and farinaceous matter must drain the liver of this excessive amount of glucous, and thus arrest in a similar proportion the diabetic tendency. Reflecting on this chain of argument, and knowing too that a saccharine and farinaceous diet is used to fatten certain animals, and that in diabetis, the whole of the fat of the body rapidly disappears, it occurred to me that excessive obesity might be allied to diabetis as to its cause, although widely diverse in its development; and that if a purely animal diet was useful in the latter disease, a combination of animal food

with such vegetable matters as contained neither sugar nor starch, might serve to arrest the undue formation of fat."

From recent experiments made by Voit, it was shown that a purely animal diet, freed as far as possible from fatty matter, is incapable of producing corpulence, or even of adding to the weight of the body.

"Dogs were fed on pure flesh, and the change of weight in their bodies, and the quantity of nitrogen which was given off during this time, carefully noted. The result of these experiments was the remarkable discovery, that even with a diet very rich in flesh, the animals scarcely increased in weight, but were only just able to equalize waste and repair. The more flesh, free from fat, was given them, the more completely was it assimilated in the body, without its organs becoming richer in albumen. If the amount of flesh given was inconsiderable, a loss of weight took place, the animal giving off more albumen in the form of *excreta* than it took up with its food. Comparatively small quantities of fat had a remarkable influence on the process of nourishment. Under this latter treatment the quantity of nitrogen excreted immediately declined; and when there was a somewhat larger amount of flesh in the food, the absorptive and excretive processes were found to balance each other. If the proportion of flesh in this mixed diet was increased, a greater increase of flesh took place in the body than could be obtained by an exclusively flesh diet, however generous."

In another series of experiments made relative to the effect of diet on the *products of respiration*, the most notable effect of fatty food was found to be *a diminution of the oxygen consumed.* "Hence to bring down a fatty body," says Voit, "we must get it to take in a larger supply of oxygen. This can best be done by cutting off all the fat and carbo-hydrates, and increasing the quantity of proteids. The effect of increasing the proteids is to augment the metamorphosis taking place in the blood, and diminish the storing up of material in the tissues, in the shape either of flesh or fat. The store of fat existing in the body is consequently more and more encroached upon, and in spite of the great metamorphosis taking place in the circulation, the body continues to get lean."

Harvey, in giving an account of the manner in which he tested his own theory, the result of observations and reflections on the physiological experiments of M. Bernard, says,—"A dispensary patient, who consulted me for deafness, and who was enormously corpulent, I found to have no distinguishable disease of the ear. I therefore suspected that his deafness arose from the great development of adipose matter in the throat, pressing upon and stopping up the eustachian tubes. I subjected him to a strict non-farinaceous and non-saccharine diet, and treated him with a volatile alkali, and occasional aperients, and in about seven months he was reduced to almost normal proportions, his hearing restored, and his general health immensely improved. This case seemed to give substance and reality to my conjectures, which further experience has confirmed.

"When we consider that fat is what is termed hydro-carbon, and deposits itself so insidiously and yet so gradually amongst the tissues of the body, it is at once manifest that we require such substances as contain a superfluity of oxygen and nitrogen to arrest its formation and to vitalize the system. This is the principle upon which a proper diet in such cases works, and explains on the one hand the necessity of abstaining from all vegetable roots which hold a large quantity of saccharine matter, and on the other the beneficial effects derivable from those vegetables, the fruits of which are on the exterior of the earth, as they lose, probably by means of the sun's action, a large proportion of their sugar.

In conclusion, the following dietary is suggested as one that will be found useful in obesity, and in diseases that are in any way influenced by a disordered condition of the hepatic functions. Bread, except in the form of dry toast, butter, milk, sugar, beer, potatoes, parsnips,

beet-root, turnips, carrots, veal, pork, herrings, eels and salmon are among the things to be abstained from, on account of their containing starch, saccharine, or oily matter, or from their indigestibility under the circumstances. On the other hand, beef, mutton, lamb, venison, poultry, game, fish (with the exceptions already made) eggs, if not hard boiled, green vegetables, plain boiled rice, dry toast, and rusk in small quantity, several varieties of fruit, old cheese, occasionally and sparingly, tea without milk or sugar, and various other articles may be used with advantage; due regard being had to regularity, as to the times of eating and to the quantity eaten. Stimulants, such as whiskey, gin, brandy, or wine, may in some cases be used with benefit, but should never be employed except under the advice of a competent physician.

Let persons who are troubled with fatty accumulations adopt a course of living in accordance with these suggestive outlines, and at the same time give proper attention to regimen, and to nervous and mental activity, and they will not fail to improve, by the gradual loss of their superfluous burden.

Sir James Y. Simpson.—A cable despatch of May 7th, made the announcement of the death of Sir James Y. Simpson, Bart., the celebrated professor of midwifery in the University of Edinburgh.

His death took place on the 6th, occasioned by rheumatic affection of the heart, from which he had suffered for some weeks previous. He died at the comparatively early age of 59.

He was not only regarded as an eminently scientific man in his special department, and as at the head of the profession in his own country, but commanded the respect and esteem of the medical profession of the world.

He was one of a very few, who, by his own efforts, raised himself by real merit to positions of distinction and eminence;—and gave to the world the result of long and patient research, the fruits of which shall descend through the present, to future generations. No longer ago than last autumn he was presented with the freedom of the city of Edinburgh, and on which occasion he gave the following interesting account of his early career:

"'Tis full forty years since I came first to Edinburgh, and entered its university as a very, very young, and very solitary, very poor, and almost friendless student. But matters are now so entirely changed and reversed that I feel at this moment as if in the distinction which you have conferred upon me, the community of Edinburgh, as a body, offered me the right hand of cordial fellowship and the kindliest felicitations. Nor was my original ambition in any way very great. After obtaining my surgical diploma I became a candidate for a situation in the west of Scotland, for the attainment of which I fancied that I possessed some casual local interest. The situation was surgeon to the small village of Inverkip, on the Clyde. When not selected, I felt perhaps a deeper amount of chagrin and dissapointment than I have ever experienced since that date. If chosen, I would probably have been working there as a village doctor still. But like many other men, I have found strong reason to recognize the mighty fact that assuredly

> "There's a Divinity doth shape our ends,
> Rough hew them how we will."

Or, in the language of the French proverb, "Man proposes, but God disposes." Through the ceaseless love and kindness of a dear elder brother, and in consequence of gaining the Macpherson University Bursary, I was enabled to study for some time longer at the university, and obtain my medical degree. Professor Thompson—to whom I was then personally unknown,—happened accidently to have allotted to him my graduation thesis. He approved of it, and engaged me as his assistant, and hence, in brief, I came to settle down a citizen of Edinburgh, and fight amongst you a hard and up-hill battle of life for bread, and name, and fame; and the fact that I stand before you this day so far testifies that in this arduous struggle I have won. Some seven or eight years after my gradua-

tion, and in this very room, all the fortune and destiny of my future life were one forenoon swayed and settled by a vote of the Town Council of Edinburgh, when they elected me professor of midwifery in the university. On the day of election one of the patrons eagerly urged in this hall that if I were chosen as Dr. Hamilton's successor, the hotel-keepers, merchants, and others in the city, would have good reason to complain, as I could never be expected, like him, to induce patients to come occasionally from a distance to our city. But I think that phrophetical objection has been even more fully gainsayed than the other; for I believe I have had the good fortune to draw towards our beloved and romantic town more strangers than ever sought it before for mere health's sake; and that, too, from most parts of the globe — from America and Australia, from Asia and Africa, and from the various kingdoms of Europe. The Lord Provost has alluded in too flattering terms to some of the portions of the work which I have been permitted to do during my professional life. I only wish my deserts were more worthy of your kind eulogy; for sometimes, when I look back and reflect, I feel regret and dismay that my avocations and my idleness have prevented me from doing more for the promotion of a science and art which, like medicine, calls aloud for so much devotion and study from its followers and votaries.

SOMETHING VERY NEW — *Illumination of the body.* — When persons are talked of as having obtained "illumination," no one supposes that the remark is to be understood literally, as if the illuminated individual were brilliantly lit up internally with candles or gas in the manner of a town during times of public rejoicing. Henceforth, however, when we speak of men's enlightenment or illumination, it will be necessary to state whether the words are used literally or by way of metaphor. A Russian physician has discovered a method of so using the electric light that the whole interior of the human machine may be observed, "almost," it is said, "as if skin and flesh were transparent." A few weeks since, Dr. Milio, the inventor in question, who is a celebrated surgeon of Kieff, lectured at St. Petersburg on this astonishing discovery he has made. In demonstration of the feasibility of his process he placed a bullet in his mouth, and then caused the electric light to shine full upon his face, whereupon the bullet became distinctly visible through his cheek. The especial utility of his discovery he considers to be that foreign bodies, as bullets, lodged in the flesh, can thus have their whereabouts infallibly ascertained, without the danger and martyrdom of perpetual insertion of probes. Dr. Milio further maintains that in cases where the bullet contains the smallest admixture of steel, he can provide for its extraction by the application of magnetism.

ANSWER TO A. F. M. — *Red Scars.* — The redness of recently healed incised or lacerated wounds is caused by newly formed blood-vessels, by the aid of which the new tissue was formed which constitutes the substance of the scar. As the scar grows older the blood-vessels diminish in size, just in proportion as less nutrition is necessary. Any chemical application to whiten it would be worse than useless. In some few cases arising from neglect, carelessness, or malpractice, a surgical operation may perhaps be performed with advantage, but each case can only be determined, on examination by a competent surgeon. Time, however, is the best and only reliable remedy in such cases, though it may require from one to several years to remove it wholly. A very little assistance may be rendered by the application of substances which are not irritating in themselves, such as glycerine or dark collodion, to exclude the oxygen of the atmosphere, and as far as may be from the light.

ANSWER TO A.R.—*Scarlet Fever.*— Articles on this subject can be found on pages 92 and 365, vol. 1.

[Reading for a Leisure Hour.]

LIFE.

WHAT is life? The answers to this universal query would fill volumes. In each reply there is a view of the respondent's life. Let us glance at a few of them.

The first gentleman who undertakes to define life for us is not of the most amiable cast of mind; decidedly not the gentleman we should be inclined to make a voyage round the world with. He begs to inform us that life is a desolate journey, beset at every step by briers. Not at all an encouraging prospect to young people, flushed with hope, who are starting on the voyage, — who are just about to put their first finger upon the treacherous thorns. This gentleman we recognize as of that peculiar class who put mourning upon brides,— reminding them, just by way of damping their present happiness, — that the morrow may find their lover in his grave. Not quite a reasonable course this, in our opinion. We all know that death is inevitable, and not a few of us, let us hope, do something as we proceed in life, to fortify us for the approach of the enemy when he advances upon us. But why be sniffing continually at the door of the charnel-house?

Another individual approaches with a definition. He is a solemn man, not to be lightly approached by any one. He is not to be trifled with on any occasion. We should say he did not smile on his wedding-day. Life, he tells us, is but a journey to the grave; therefore, men are to pucker their faces into the most serious expression, and live near an undertaker. This is a most melancholy gentleman, who wears his sadness as other men wear holiday looks,— who is, in fact, very proud of his solemn aspect. He shines at funerals; and perhaps the proudest moment of his life was when, as chief mourner, he followed his friend to the grave, between rows of staring strangers.

And now comes a jovial reckless fellow. He is a little worn, we think, and the brightness of his eye suggests the use of artificial stimulants. He is a thoroughly careless man. Careless of dress, careless as a husband, careless as a father, particularly careless in business, — and careful only to imbibe his proper, or rather improper, quantity of spirits before going to bed. Yet he, with all his *laissez faire* logic, has his definition of life. He brings it out patly enough, ask him when you may, — to him life is a farce. He is, at bottom, a hapless individual, with very little faith in the social virtues; inclined to laugh at heroism and to palliate ruffianism; yet, himself, a thoroughly good-hearted fellow.

A pretty girl now trips towards us with her definition. She is of the sentimental school; we see that at once. She has a white rose in her hair; her cheek is pale, and she sighs frequently. "Life," she says, "is a flower,— to-day, bright and beautiful, and to-morrow, nipt by the frost." We thought so; exactly the definition we expected. She is a young lady who, possessing much natural sense, and having one day opened an odd volume of philosophy, conceives that she has an insight not vouchsafed to common mortals, — that she is etherealized, and that all her thoughts must be conveyed to the outer world in metaphors. She is passionately fond of flowers, adores the megatherium, and has much to say (out of an elementary geological work) on the tertiary formation. She informs her partner, in the course of a quadrille, that experience teaches her she exists as a tangible reality, but philosophy tells her that she only exists in her imagination. Many readers have met the young lady. The last we heard of her was, that she had adopted the Bloomer costume.

And now we are to observe a very sallow young gentleman, buried in the muslin and gauze of a dozen young ladies, who are listening with open mouths. We remark that the young gentleman's hair is worn extremely long, and parted down the middle of his head. The world is allowed to see much of this young gentleman's neck, we also perceive. A glance at his shirt-collar — completing the solemn picture — we recognize the unacknowledged poet; the injured individual who haunts the coteries of fashion to while away time, till posterity pronounces a final and triumphant verdict on his poems, entitled, "Sarah Jane, and other Verses." Here he is, an infinitely condescending Apollo, and the young ladies, not without trepidation, hint that they have blank leaves in their albums. To one he gives an impromptu written on the summit of Mount Washington; to another favored lady he presents his lines on the decease of a faithful spaniel; and, to a third, he offers an answer to the great question. Here it is: "Life is a rapid river, flowing into a mysterious sea." This definition, according to the poet's confidential friend, is true poetry, for, "it leaves plenty to the imagination." Our poet deals in the vague and mysterious exclusively; and dandles Death through his verses with that sportive activity which, according to himself, only truly great minds can comprehend. He plays at football with the destinies, and terrifies young ladies by the levity with which he alludes to all that is solemn in life, and terrible in

death. All this is a great pity; he would have made a capital banker's clerk. But, luckily, one of his circle has the hardihood to rebuke the presumption of his verse; to advise the cutting of his hair, and the danger in which his exposed neck runs. This bold friend is a lady, who, if she have any pride, is proud of the gentleman she "sits under." She is an uneasy maiden female of five-and-thirty, who thinks that jewellers should be indicted for openly displaying wedding-rings in their shop-windows. Her coffin is continually before her eyes. She has the profoundest conviction of the uncertainty of things, and is known to have rebuked a jovial party for appointing a future picnic, without reflecting that they might all be in their graves before the day arrived. She tells her friends that life is a thread, snapt in an instant. She has lately advertised for a situation as a cheerful companion to a nervous or hypochondriacal person.

And now let us stop another passenger in the great thoroughfare of the world. Care has tattooed his face terribly; lines intersect every inch of his forehead; his eyes lie back from the daylight, under his puckered brow; coarse lines ramble about his mouth; — we linger no longer over the picture: he has fought a great, stern battle with the world, and has lost. The honey of his young nature has turned to gall. He has not a smile left for any of us. Well, not a few of these stern men pace our streets, with sixty years upon their shoulders, and empty purses in their pockets. They are men who have prospered in the beginning, and failed in the end. And they whisper in the ears of the flushed youths who hasten past them in the great struggle, words of sad import—syllables that slacken the vigor of young blood often. Life, our tattooed friend declares, is a hideous nightmare. Toil, and fret, and woe, encompassing us all, at every step we advance, only bid us farewell when the sexton takes us in hand.

Not by any two of us, in short — not by the bride and bridegroom at God's altar — is the question answerable in the same phrase. We have a letter from an old-fashioned friend of ours, who has adopted an answer to the question under discussion, as his seal. A vessel (whether brig or schooner the engraver has not allowed us to determine) is rolling tremendously upon a red cornelian sea, so that it is evident to the most inexperienced spectator she cannot keep above water, or above cornelian, many minutes. Under this terrible picture are these words —"Such is Life!" Life, to a vast number of persons, is a path of various widths: to the very serious it is the narrowest of paths; to the jocose, it is a broad and pleasant highway; to the young, it is a green lane, hedged with flowers, and arched over with the "crescent-promise" of the rainbow; to the sceptical, it is a maze. To another crowd of individuals, life presents itself in various spaces of time; to thousands it is a brief hour, and, to the particularly philosophic, a second, and no more. An impetuous friend interposes with his definition, and as it represents, in some way, the class of answers we should receive from the numbers who go through life, panting all the way with the speed of their progress, we give it. Life, says our impetuous friend, is a flash of lightning.

The vexed question has, in truth, so many answers, that they might fill thick octavo volumes. Every poet, every statesman, every essayist, every philosopher, has had his epigrammatic reply to our question. Mr. Carlyle starts forward with one —

> "What is life? A thawing ice-board
> On a sea with sunny shore —
> Gay we sail — it melts beneath us,
> We are sunk, and seen no more."

Generally, to assure us of its rapid extinction, have poets written types of life. According to one poet it is "a sweet delusion;" while another plaintively asks —

> "Oh Life! is *all* thy song
> Endure, and — die?"

Surely, not in any sense can life be so interpreted; for, if it were so, in vain would the poet's song be, and all unnoticed the mid-day lark might make the heavens musical to us. Other poetical friends approach with definitions:

> "Our life is an idle boat
> Along a winding river."

Here a gleam of philosophy lights the burden. Idle the boat is, generally, compared with its capacity for navigation, and little often do we accomplish of the mighty sum of labor that lies in the hands of the weakest of us; but not altogether contemptible are our realizations, and it is hardly for us, with all our weakness of purpose, to cry aloud woe and sadness, and let the boat float errandless and empty out to sea.

We are fairly besieged with definitions now. Life is a boat, an iceberg, a muddy stream, a pellucid river, a game at chess, the toss of a coin; a bubble, a comedy, a tragedy, a burlesque, a poem to the end, a dull passage of prose, an ebbing tide, a sandbank, a dream, a fitful fever, etc., etc., etc. It is interpreted by a thousand images, because it has its thousand phases,— because it is supportable or insupportable, according to the realizations of each individual. It is a dream to those who wander through the world with their hands in their pockets, as Longfellow infers:

> "Tell me not, in mournful numbers,
> Life is but an empty dream;
> For the soul is dead that slumbers,
> And things are not what they seem."

To the heated speculator, busy with the rise and fall of funds, it is the toss of a coin;

to the indifferent, it is a comedy; to few, indeed, let us hope, is it a dull passage of prose; and to fewer still may it be a tragedy; but may many say with Longfellow again —

> "Life is real — life is earnest,
> And our hearts, though stout and brave,
> Still, like muffled drums are beating,
> Funeral marches to the grave."

And now we must close our chapter of definitions. Not to doleful music would we give our own particular definition; but rather to a cheerful measure, full of harmony, a touch of tenderness here and there, always a thoroughly correct and earnest accompaniment, and happy light airs treading upon the mournful burdens, to relieve the whole.

DO YOU WEAR GLASSES?

IT is really curious — the use of spectacles — how they trouble and mortify "some folks." Many are very slow to acknowledge their need of them, and are willing to experience much inconvenience rather than put them on. The gentleman takes up his evening paper to read the news. There he sits, in his easy-chair, holding up the sheet at arms' length, with eyes half shut—squinting — striving to follow the separate words and lines. It troubles him exceedingly, for the print looks dim and hazy. "Mother," says he, (or dear,) "suppose we have a l-i-t-t-l-e more gas? the light is *very* poor this evening. It appears to me the article grows poorer and poorer every quarter. This confounded Gas Light Co. monopoly! We *must* have an opposition." (He is right, if he lives in Boston; but that would not restore his sight.) The kind wife smiles obedience; the "fish-tails" are spread to their full extent; but he is troubled still. He secretly makes up his mind to purchase glasses, but it requires an enormous effort and long delay before the deed is done.

If a lady the experience is similar — the only difference being that her principle trouble is to thread her needle. After tea she takes her book and sewing. How motherly and neat she looks. The little work-basket is in perfect trim. How nice each spool is wound—thread, silk, and cord. The needle-case — how tasteful and bright and orderly — just like herself; and the ball of yarn! How cheerful the room is, and how pleasant every face. The children, as usual, are extravagant in their expressions as they rehearse their after-school walk to the Public Garden or elsewhere. Everything, with them, has been splendid, except Harry, who uses the expression "a regular gazer;" and pa and ma expatiate upon their beautiful drive around the suburbs. The cares of the day are over — the servants have performed well their allotted tasks — (we now hear their merry laugh) — the coffee, and everything connected with the morning meal had been satisfactory and charming —(the ice-man seldom "misses" and the milk-man never) — the dinner, in all its variety (dessert included), had brought joy to every heart — the cosy "tea" had been a season of the sweetest harmony. This was their every-day atmosphere. The mother has been rightly "trained," therefore scolding and fretting in this house were unknown.

Even such eyes in time require a little artificial help, but our lady-mother calls one of the children to thread her needle after she herself had made various attempts to do so. Oh, how many times she tried! — putting the thread to her lips, and biting off the end — then twisting it between her slender fingers to prepare a point. At length she slowly aims at the needle's eye. The thread passes along its side — first to the right, then to the left — then over the top; repeating this operation several times — now and then almost "in" — much to the amusement of the children, and of puss, too, for she is sitting at her mistress's feet looking straight up into her face, purring in deep notes, and winking. One evening at last she says to her husband, "I do believe, Charlie, *my* eyes are failing, and must resort to glasses; let me try on yours." She places them upon her nose — looking up, and down, and over them — every eye upon her — making the children laugh and clap their hands — and they all exclaim "How funny ma looks with glasses!" and then they shout again. "Who does your mother look like?" asks the father, smiling through his happy tears, for he had laughed as loud and long as any of the children. She looks just like ever so many people whom the family name over. She looks like the minister's wife where they boarded one season — the lady who sits in Dr. Pullem, the dentist's, pew — the lady whom they met last summer at North Conway — the elderly lady who wears a hat — and she looks *just* like Mrs. Glassim. In fact she looks like quite a host of persons whom they have seen. Little Ella wishes to "try them on," and *she* looks "as cunning as a mouse," so her elder sister says; and when she starts and walks the room with them still perched upon her nose — head thrown back to keep them from falling off — her little brother asks "if they wouldn't think it was grandma!" When we can no longer "do" without them we purchase our spectacles. At first we wear them "on the sly." We sit down to read — take them from their case — adjust

them upon our nose. O, what a luxury! How large and fair the print now appears, even the very smallest. To be sure there is a trifle of dizziness in the head — and our nose does feel a little pinched — but we "get used" to them — and soon to ourselves declare that we would not be without them for the largest pile of gold.

The whole lesson is not yet learned. It is evening again. Our boots are off — our feet encased in slippers (Christmas present). We are cosily seated in our arm-chair, specs on nose — our heart full of content — whiffing away at our cigar, and reading the latest "irregularity," or the profound remarks of George Francis Train upon the "Impeachment of Gen. Grant." The door-bell rings. It is Uncle Joshua; of course they will "show him up" — into the parlors. By Jove, no! "Uncle Josh" is a great favorite with us all. The children shout, "Come right into the sitting-room — we are all *here!* They rush out into the hall and pull him into the room before I have time to hide my specs. How confusing! I would rather he should not have caught me. I don't know why — do you? We pass through many such scenes (at home and elsewhere) before becoming quite settled in our habit of wearing glasses. Such was *my* experience. I have outgrown it now.

But the great bother is to *keep* them after we have "got" them. How often we lose sight of them! and *now* we cannot do without . . . If they are gone we have no eyes — at least for reading. "Why, father what are you looking for?" "My specs, dear; have you seen them anywhere? I had them only a moment since. See if you can find them; your eyes are sharp. Where could I have lain them?" We hunt everywhere; — up stairs — down stairs; — open books — look over the carpet — examine table-cover, over, under; — feel into pockets — yes — no; — stand amazed — look at register—it is closely shut, can't imagine—how very strange — grow impatient — think they are hid — playing joke — don't like such nonsense — stamp foot — roll eyes— scratch head — hit against something on cheek — ☞ — find them. Here they are! On my nose! (Fact.) G. B. Watson.

Whistling. — Good whistling may sometimes be heard, but, as a rule, a ploughboy will outstrip any well-bred man in whistling. The reason is, probably, that he is never haunted by a sense of the ridiculousness of his face, as he purses his mouth into the form for whistling. A friend of mine, who enjoyed a far-famed reputation for whistling, was repeatedly asked to exercise his talent at dinner and evening parties. But he would comply with the request only on condition that he might be permitted to turn his back on the company. His demand was on all occasions granted, whereupon he would turn round, and begin to whistle any tune he was desired. One day he was asked to favor his friends with a piece from La Somnambula, and, as was his wont, he wheeled round, and fixing his eyes on the ground, commenced whistling. Happening, however, to raise his eyes towards the conclusion of the air, he saw in a large mirror before him, the countenance of his auditors, some of whom were trying to restrain their mirth; this was too much for him, and the tune was abruptly put a stop to, by a loud burst of laughter from the gentleman himself. An Englishman some years since gave several specimens of his skill in whistling, and got up a class to teach it. Of course there was giggling before the lesson actually commenced, but it was presently exhausted; and the class, with solemn faces, waited for the tutor, who was trilling a few preparatory cadenzas. The order came,— "Gentlemen, *prepare to pucker!*" as he pursed up his lips. The class never got beyond that point.

The Trichinoscope. — Can you imagine for what it is intended? I suppose you have heard of certain deadly worms — small as hairs, and, therefore, called Trichinæ — which infest pork? It is intended by means of the trichinoscope that if you have sausage or ham placed before you at table, you should be in a position to ascertain by ocular demonstration whether or not it is pervaded by parasites! Surely it is better to abjure the unclean beast altogether than to be afflicted with such hideous fears of the consequences of eating him. I saw a distinguished chemist, the other day, begin his dinner by swallowing some pills of pepsine, made from the stomach of a pig. The pills were intended to enable him to digest the huge dinner which he had vowed to devour.

Genuine Port Wine. — Cider, 14 oz.; alcohol, 3 oz.; strong decoction of logwood, 4 oz.; alum, 40 grains; cream of tartar, 20 grains; white sugar, 1½ oz. This being a *native* wine, is largely patronized in America. By all means make it for yourself. It will be much cheaper than to buy it, and you will have the satisfaction of knowing that it is unadulterated.

The Negro's Bet with the Donkey.— You not go on, sar? dat a fact, eh, sar? Well, sar, I bet you *a bit* I make you go — eh, sar, what you say, dat a bet! Well; done, sar." The animal appeared to accept the wager, as he laid back his ears to the fullest extent, threw out his forelegs, and evinced no intention of moving. The negro then, spitting copiously on his hands, came behind the donkey, and grasping his tail, proceeded to twist it round with all his force: the animal at once gave in, and started off at a brisk trot. The negro was

preparing to follow, when my friend hailed him, and said, "So you have won your bet; how will you get paid?" "Oh, massa," he answered with a grin, "my missey gib me dis (producing a bit from his pocket, which is a colonial coin, worth about fourpence) to buy him a feed of carn when we get to Kingston; I gib him notink now, and jest spend de bit on lilly drap of sometink good for tomack."

THE ALBUM. — Dumas, the younger, was perpetually being worried by applications for his autograph and epigrams. One day a fashionable physician at some watering place brought Dumas his album, and insisted upon a trifle from the Lion, who found himself fairly caught in the toils. Dumas wrote, and the smiling physician, nodding to his admiring friends, looked over the author's shoulder. Following Dumas' pen, he read:

"So great is M. T. (the physician's name)'s skill, so marvellous his success, that since he has practised in this place, three out of five hospitals have been pulled down as useless, ——"

The physician, delighted with the flattery, interrupted him, protesting that the compliment was too great, was undeserved, and so forth. Dumas begged to be allowed to finish the sentence, and the permission being gladly given, he continued,

"and in their stead it has been found necessary to build *two new cemeteries.*"

Dumas the younger wasn't asked to write in *this* album again.

PHOTOGRAPHS BY ELECTRICITY. — In the use of electric light to multiply impressions of portraits, there is nothing very striking in the fact taken by itself; but the consideration of it develops a curiosity of nature and of art. The light in this particular instance is produced by the conversion of mechanical force into electricity. The mechanical force is supplied by a steam-engine, which draws its power from the combustion of coals; so that the coal is the source of light after all. But the coal derived its energy from the solar rays that ripened the vegetation of which it was formed thousands of years ago; it is, to use George Stephenson's term, bottled sunshine. Hence it follows that the beauty who sits to the camera, really has her portrait printed by the "light of other days."

DIETETICS. — The Chinese Feast of Lanterns must be very light eating.

IT is with health as with our property — we rarely trouble ourselves in looking seriously after it until there is very little of it left to look after.

THE Bread of Repentance we eat is in many instances made of the wild oats we sow in our youth.

LOVE, the toothache, smoke, a cough, and a tight boot, are things which cannot be kept secret very long.

MANY persons take advice as they do physic — to fling it aside the moment the Doctor's back is turned.

THE SECRET OF POPULARITY. — Come into a fortune, and then your friends will discover in you qualities of the most superlative brilliancy, the existence of which, in your moments of most intoxicated vanity, you never suspected before.

THE BATTLE OF WOMAN. — A girl of fifteen displays courage amounting to rashness in her first engagement, but is usually deficient in steadiness.

RECREATIONS IN NATURAL HISTORY. — A young gentleman of a lively turn, sent his slow friend to an ornithologist for a yellow-hammer to drive a nail.

TRUTH FOR TEETOTALLERS. — The porter that is stout will carry the biggest man beyond the bounds of discretion.

HEALTH AND BEAUTY. — The young lady who is unable to sport a riding habit, should get into a walking habit.

EXPERIENCE is a pocket-compass that a fool never thinks of consulting until he has lost his way.

THE heart is a nursery of the tenderest plants to which the least chill often proves most destructive.

ALWAYS FAITHFUL.

Happy is *he*, who, ere his mother, *dieth* —
For so shall *one* remember where he lieth.

It shall not be as though he ne'er had been,
For one shall keep both grave and memory green.

An anguished love over its child shall brood
With constancy but dimly understood,

By such as dash their all of grief away
In boisterous tears upon a funeral day.

One weeps when pomp of mourning has passed by,
Seen oftenest, only by the Unseen Eye.

Her first, deep bitterness, poignant as vain,
God may draw out in soul-relieving rain;

By dint of tears, her heart may keep from breaking,
But God's strength only helps her bear its aching;

Time fills not with a new, the broken tie,
Nor brings oblivion, if it pacify.

Then blest is *he*, who, ere his mother, *dieth* —
For so shall *one* remember where he lieth.

CHARLOTTE F. BATES.

CAMBRIDGE.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

HEALTH AND OCCUPATION.

A VERY close relation exists between health and occupation; and the more widely a knowledge of the principles of sanitary science is diffused, the more certainly will the health and happiness of our working population be secured. It is always the feeble and unhealthy who are the most dissatisfied with their lot, and clamorous for the reform millennium; the healthy body and satisfied mind exist together, and a man who has health to enable him to overcome obstacles and make his way in the world, is not likely to be very particular about the roughness of the road.

The influence of occupation on the health is not a subject for the consideration of a single class; for what overwork of body does for those who earn their daily bread in "the sweat of their brow," overstrain of mind effects for those who live by their brains. There have been many instances from the ranks of literature, science, and art, of men whose lives have been sacrificed by too intense devotion to their pursuits. Mendelssohn, who concentrated more brain-work within his short life than has sufficed for many whose years have extended to ten decades, died of paralysis at thirty-eight; his premature end most surely hastened by the perpetual unrest in which he spent his every day.

Our subject readily divides itself into two sections, viz., influences general and indirect; influences special and direct.

Amongst the former we refer to conditions of defective ventilation, overcrowding, long hours, etc.; and under the latter head we shall classify the injurious influences of particular trades. The packing together of numbers of human beings in a confined room, tends at once to impair the purity of the air; for its vivifying principle, oxygen, is replaced by that most injurious gas, carbonic acid. It is a primary natural law that man needs an abundance of pure air to support his healthy existence.

How imperfectly this requirement is supplied in large manufactories, and what a powerful source of mischief is at work in such places, may be indicated by the following facts. In 100,000 parts of pure air, there are rarely found more than 30 parts of carbonic acid: in rooms in cities freely ventilated, the proportion rises to 80 parts in the same volume, while in ill-ventilated rooms and workshops there have been found from 100 to 700 parts, or twenty times nature's allowance. The working classes are exposed to no more fruitful cause of disease than this excess of carbonic acid in the air which surrounds them. When a high percentage of carbonic acid prevails, the circulation of the breathers is generally observed to become enfeebled, the frequency of respiration to increase, and nervous power to fail. Much of the consumption and scrofula of town populations is due to an atmosphere overcharged with this gas. Nothing affects its power for ill so much as an elevated temperature. "Thus even 1 per cent. of carbonic acid may be endured at a temperature under 50° Fahrenheit, which at 70° or 80° would be absolutely intolerable." On entering a close room in which a number of persons have been employed for many

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hours, the atmosphere seems quite unbearable, and we gasp for an open window; while the workpeople, accustomed to the vitiated atmosphere, seem to breathe with ease, and say they do not feel any inconvenience. Is the closeness innocuous because it is not felt? By no means. Acclimatization is dearly bought. By the gradual depression of all the functions, less oxygen is absorbed, and the vitiated air then suffices for an enfeebled organism, just as it would for the respiration of a cold-blooded animal. This kind of vital depression when frequently experienced is destructive to the elasticity and vigor of those exposed to it. In such an atmosphere, rapid and efficient work, to say nothing of comfort and happiness, is out of the question. It is gratifying to find where sanitary regulations have been established, that very decided physical improvement has been effected.

A sufficient cubic space should be allowed to every factory hand; and regard should be had no less to the quality than the quantity of the air supplied.

Plainly, to manufacture perfectly pure air and deliver it on the premises, is impossible; we must, therefore, do what we can to keep it wholesome, by devoting strict attention to ventilation, by the adoption of disinfectants for drains and sewers, so as to kill or render innocuous all organic impurities, and by the preservation of open spaces in and near the great centres of industry. The ventilation of mines should be under legislative regulation, and the most beneficial results would follow, for many lives would be thus saved annually. The ventilation of lodging-houses should also be subjected to police supervision in the interests of their casual occupants. Surely the thousands who spend their lives in the workshops and manufactories have even a greater claim on the care of the State.

Much also might be done by the working classes themselves, by the cultivation of habits of personal cleanliness. The fact must not be disguised, that a most baneful consequence of overcrowding is the vitiation of the air by the emanations from the bodies of diseased or uncleansed persons. French scientific investigation has disclosed the unpleasant fact that skin dirt, composed of perspiration, oily matter, and dust, contains myriads of microscopic existences, both vegetable and animal. These cutaneous emanations are dissipated in and affect the air; add to these the pulmonary exhalations of consumptive and scrofulous persons, and some idea may be formed of the risk to health incurred by those whose days are spent in an atmosphere so highly charged with organic impurities. "The greater the aggregation of unwashed human masses, the more horrible must be the resulting atmospheric impurity." (Rumsey.)

In calculating the amount of evil arising from general causes, such as those now under consideration, the fact should not be overlooked, that although there may be no fatal disease, a condition of what has been called negative health is sure to be engendered, and the majority of the workers become debilitated, until life itself becomes a misery.

It is impossible to over-estimate the advantages which accrue to those who can mitigate the effects of the poison inhaled during the day by a residence where —

'Tis rural: trees are to be seen
From every window, and the fields are green;

and it should be a matter for general congratulation that the building of dwellings for the laboring classes in the suburbs, and cheap trains for their accommodation, have brought this immense privilege within the reach of many who could not a few years ago have obtained it.

The working classes hold a remedy against long hours in their own hands; but it is surprising to notice how slow they are to avail themselves of it. Indeed, they may be said in one respect to be consenting parties to the prevalence of this evil, for the adults are in most instances not slow to seize the opportunity of earning "overtime," and parents will go so far as to put pressure upon managers to employ children of tender years, and do not scruple to misstate the age of their little ones. Let

operatives work more quickly while they are at work, that they may have time for rest or recreation after the day's work is over; for by means such as these they are more surely promoting their best interests than by falling in with the arbitrary regulations of trades' unions, as that, for instance, which enjoins that a man must only use one hand in laying a brick. The lower orders of the working classes might well take a lesson from the change which has passed over the habits of city men of business. A few years ago the ordinary working hours were from 8 A.M. to 7 P.M.; whereas now 10 to 5 is the rule; work which formerly occupied ten to twelve hours being now accomplished in half that time. But we can scarcely expect that any real improvement in the particulars we have mentioned will result until the elementary laws of health are taught in our schools, and the working population have learned how much the maintenance of the sound mind in the sound body, "the only fund to which they must look for their subsistence through life," depends on themselves. May we not hope that the American workman will determine to secure for himself those advantages which his own vigor and energy so well qualify him to attain?

The general or indirect influences which affect the health of the operative class, have hitherto engaged our attention. We will now refer to those directly attributable to certain callings. Such a large proportion of the ailments and diseases of this section of the population have so intimate a relation to their occupation, that it is difficult to deal with the subject within the limits of a single article.

A few additional particulars in explanation of the above summary may be of interest. The destructive influence of the steel-grinding trades is such, that the average age of those engaged in them does not exceed thirty years; the men early contract the "grinder's complaint," an asthmatic cough which ends in consumption, life becomes a burden, and the frames of the poor sufferers waste away, by a repetition of slow tortures.

Flour, and more particularly dried "corn flour," is almost as injurious as metallic dust, affecting the constitution in much the same way. Bakers and millers are a short-lived class of men, seldom attaining more than forty years. "Shoddy grinders," boys employed in paper manufactories to sort, pick, and tear up old rags, suffer from a peculiar form of bronchitis caused by their dusty work, and many others are similarly affected. The principal predisposing cause of the ailments of tailors and shoemakers is the adherence of these trades to the practice which demands that while at the "board" they shall squeeze themselves up into the most ridiculous of postures; which it is obvious must considerably curtail the space allotted to the free action of the vital organs. The adoption of the sewing machine is, however, taking much work out of the hands of the journeymen tailors, a girl being able in a week to attain as great proficiency in sewing or stitching as an apprentice would take two years to achieve with his unassisted needle.

The hard lot of milliners is well known. We mention their case only for the purpose of suggesting that the public who employ them might, by careful foresight, do more than the masters for the alleviation of their misfortunes.

Our readers will hardly have expected to find that sewing machines, so freely spoken of as the remedy for the grievances of overworked seamstresses, may be themselves classed among agents of mischief; but some machines work heavily with an up-and-down movement from the hip, which soon becomes extremely wearing; while others are set in motion by a light heel-and-toe action, which may be long carried on without injury.

Our writing masters must be held responsible for much of the disease which attacks those who spend their lives at the desk, since children are taught to write with their bodies twisted into almost impossible contortions over their copy-books, instead of being allowed to sit in an easy, natural attitude. We can recommend those who have to

write much, to stand while they write, or else to sit on a chair with a back to it which may be drawn near the desk, and thus supply a rest for the back.

The arsenical compounds, mercury, lead, and antimony, the special bane of artificial flower makers, meteorological instrument makers, and of plumbers, painters and printers, are subtle poisons which insinuate themselves into the system, and so surely as they find an entrance produce most disastrous results. Arsenic and mercury speedily induce a combination of disorders which end in an early death, whilst lead and antimony deal far less mercifully with their victims. It is the feature of lead-poisoning that all the natural functions are impeded; the removal of effete and injurious matters, which is continually taking place in a healthy person, is checked; and therefore the poison remains and accumulates in the system until circulation and respiration become enfeebled, and death ensues. A painter, when discussing his mid-day meal, should realize that the lead in the paint on his hands is passing by little and little, viâ the bread and cheese, into his stomach, and may become the fruitful parent of many disorders.

A preparation of white lead (sugar of lead, as it is termed, from its sweet taste) has been largely used to whiten straw hats and bonnets. The dust is diffused through the air, and is inhaled and swallowed by the workpeople in such quantities as to be most injurious. Much illness has thus arisen, and several lives have been sacrificed. It has been suggested by a practical chemist, whose attention was drawn to the evil in question, that a paste composed of sulphate of baryta might be employed instead of the lead. This has been found to work well, and is quite innocuous. The white oxide of zinc will, on trial, be probably found equally fitted for the purpose.

These insidious foes are much more readily kept outside the walls, than ejected when they have succeeded in forcing an entrance into the citadel, and the workers in these metals should carefully adopt simple but effectual preventive measures. Too much attention cannot be given to frequent and thorough cleansing, and a very Pharisaic dread of eating with hands unwashed would prove most wholesome.

One or two exceptional cases which well illustrate our subject have recently been brought under observation. A man suffering from lead-poisoning, in reply to inquiries as to its cause, stated that he was a clown, and had been using oxide of lead in order to give his complexion the particular hue required by the traditional usages of the stage. White zinc would not have been so dangerous, though probably equally effective. This incident may be a warning to others who seek to improve their appearance by the use of similar means, for clowns are not the only persons who resort to external applications for "beautifying" the complexion.

The men employed in riveting iron ships long suffered from the consequences of inhaling the noxious fumes from the furnaces used for heating the rivets within the ship's hold; fresh air could only be obtained through the hatchways, and the men died. At length a remedy was found; the rivets were heated on deck, and allowed to slide down pipes to the part of the ship where they were required. This poison is most rife when, in a fit of misplaced economy, an attempt is made to burn impure and smoke-producing coke.

It will have been noticed that most of the occupations to which allusion has been made, have been such as are carried on in doors. The fact that those whose avocations expose them to the inclemencies of the wind and weather are far more healthy and long-lived than those who work under cover, is as remarkable as it is undoubted.

In conclusion, let it ever be borne in mind that whatever may be the specific dangers attaching to particular occupations, there is no disease so deadly as no occupation at all; it is a rust that corrodes, and a canker that corrupts all vital power both of body and mind. The absence of definite purpose in life, and of regulated effort to realize that purpose, is productive of the fatal distemper, of the languid stagnation of ennui, or of the distorted and morbid

activities of hypochondriasis, rendering God's gift of life a burden or a torment.

Human beings were never intended for indolence; even in the Garden of Eden the first of our race was appointed to dress and to keep it. It is never to be forgotten that labor is a law of our being; and even if there be some penalty involved in the difficulties and dangers attaching to labor, still it is at once man's glory and happiness to surmount and overcome them. A beneficent Creator in imposing a law attaches a blessing to obedience. Disobedience must bring its punishment. Lord Stanley has feelingly and eloquently depicted the miseries affecting those who by their worldly position seem exempted, and hold themselves exempt from the law of labor, and has commiserated those who consume much and produce nothing; production in proportion to power is the secret of a happy balancing of mind and body.

No one can take even a superficial view of the world in which we live, of the vast and ever unfolding secrets stored within its bosom, and of the marvellous faculties by which man is fitted to discover, develop, and apply those secrets, without feeling that well-regulated labor is happiness; that indolence is death; that "labor" is graven with a pen of inspiration over the field of the universe.

Chinese Method of Breeding and Fattening Fish. — The fineness and abundance of the fish in the rivers, lakes, and ponds of China, have often been noticed, and it is well known that great ingenuity and care are taken to keep up the supply by artificial breeding and other means. These modes differ according to climate and other circumstances; generally, a spot is selected where a pond or lake is shaded by trees of certain kinds, so that the water is maintained at a pretty regular and low temperature for the breeding of fish. A shallow artificial lake, or reservoir, or more frequently two such, with canals connecting them together, being prepared, the sides are puddled with clay, and around are planted the kind of trees, beneath the shade of which carp and trout love to dwell. A number of fish are netted in a river or lake, and the finest milters and spawners are selected (the latter in greater proportion than the former), and placed in the reservoirs already mentioned. The fish receive daily food, composed of certain herbaceous (probably water) plants, while small balls, composed of clay and manure, are also thrown into the water. The water of the reservoirs is frequently changed, the fish being driven into the adjoining reservoir, if there be two, or otherwise collected in tubs or tanks until the fresh water is introduced.

One thing considered essential is the exclusion of the rays of the sun from the reservoirs, and the marsh willow is one of the trees largely employed for the purpose. These trees are planted thickly around the pools, and the fish is not introduced until the branches of the trees are well developed and leafy, so that there is little danger of their dying. There is also another method in very general use for obtaining fine fish; about the month of March, small fish are caught in the rivers or lakes, and kept in the nets plunged in water until they have reached the desired size, when they are placed in pails, which are carried in the usual way on the two ends of a bamboo placed across a man's shoulder, sometimes to great distances. For the fattening of fish, the males and females are often placed in separate tanks, and fed with potatoes, boiled peas, bread, decayed roots, horse dung, and many other kinds of refuse. Some of these methods are not very intelligible; but the fact is beyond doubt, that the Chinese have studied and practised fish culture for ages, and that their rivers, lakes, and pools swarm with fish.

Antiquity of the Chignon. — Archæological research in Orissa, India, brings to light the following: Among the ancient Uriahs, the style of hair-dressing was very striking. "The chignon," we read, "was common, and some specimens bore the closest resemblance to the Parisian coiffure of the present day, and were in some instances one-third larger than the head."

THE CIRCULATION OF THE BLOOD.

BY ROBERT WHITE, JR., M.D., BOSTON.

Second Paper.

IN the first paper on this subject, the situation and construction of the heart, the course of the blood through it, the position of the valves, and their mode of action, were explained; and if the reader will refer to that article and the accompanying engravings, he will be enabled to comprehend readily the next subject I shall speak of, viz., the rythm or sounds of the heart. For the action of the heart, like that of any other machine, is accompanied with sounds audible to the educated ear, when it is applied to the chest, or when conveyed to the ear through an instrument called the stethoscope. These sounds are indicative of the heart's action, and in order to understand them properly we will review the phenomena which are produced by the action of the heart. All portions of the organ do not contract at the same time, but the two auricles and the two ventricles *do* contract *together*. We will suppose the blood has been poured into both auricles, into the right from the great veins returning it from the system generally, and into the left from the lungs. These actions follow: the *right auricle* contracts and forces the blood into the ventricle beneath, and at the same moment the *left auricle* contracts and sends the blood *it* contains into the left ventricle; a moment afterwards the *right ventricle* contracts and sends the blood just received from the auricle, through the pulmonary artery to the lungs, and the *left ventricle* acts at the same time, forcing the blood received from the lungs, — via the pulmonary vein and right auricle,—out through the aorta and the arteries over the whole body. These actions are followed by a short period of rest, during which the auricles are filled from the veins again. Now this entire movement, — all the actions just described, — take place in about *a second of time*, a fact that would seem almost incredible, but can be best illustrated by quoting from the great Harvey himself, who truly says the rapidity of these actions is not more surprising than those those exhibited "in that mechanical contrivance attached to fire-arms, where the trigger being touched, down comes the flint, strikes against the steel, elicits a spark, which falling among the powder ignites it, the flame extends, enters the barrel, causes the explosion, propels the ball, and the mark is attained; all of which, by reason of the celerity with which they happen, seem to take place in the twinkling of an eye."

Sounds of the Heart.

Probably you have seen a physician apply his ear, or a queer-shaped instrument called the stethoscope, against the chest of yourself or of some friend, and have wondered, and asked what he was doing. He is listening to the sounds of the heart, which indicate whether the valves and other portions of it are acting properly or not.

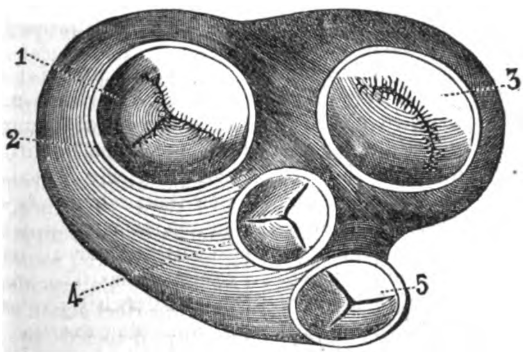
"I told her I was trying
By the gushing of her blood,
And the time she took in sighing,
To see if she were good."

You know that when the piston of a pump is not acting properly, you can hear the water gurgling back in the cylinder; and so if the valves of the heart do not properly perform their functions, the educated ear at once detects the sound of the blood trickling back into the chambers of the heart through the imperfectly closed valves. In old people the valves frequently become diseased, from a bony deposit into their substance. This is easily detected by their imperfect action, and by a harsh, grating sound when they come together. Enlargement of the heart, and imperfect action of any kind, is also readily detected by the stethoscope. A few years ago, a Frenchman named M. Groux (a physician, I think) visited most of the medical colleges of the country, and excited considerable in-

terest from the fact that the sternum or breast-bone, which ordinarily covers a large portion of the heart, was split in the centre (he having been born in this condition), so that by exerting his arms freely, the muscles attached to the sides of the bone pulled it apart, leaving the heart lying just beneath the skin, so that it could be examined as easily as if covered by a cloth only. I remember that some people very innocently thought that M. Groux could open the chest and expose the heart naked to the eye. In common with many others I saw this individual, examined his heart by the ear, and, from the sounds heard, it would be difficult to say just what would represent them. You can hear them for yourself by putting your ear to the chest of any of your friends, applying it just below the nipple, and between the fifth and sixth ribs of the left side, or, laying the finger of one hand along the ear with the point upwards, and tapping it lightly and slowly with a finger of the other hand, will give you a fair idea of the sounds. There are two of these — following each other quickly — the first is prolonged and soft, the second more short, sharp, and quick. The cause of these sounds has been disputed, and even now their origin is not fully known, but it is probable that during the first sound, the two ventricles contract, the point of the left ventricle striking against the ribs, the valves between the auricle and ventricle close the opening, and the blood is forced into the aorta and pulmonary artery; and during the second sound, the valves of the pulmonary artery and aorta shut back, the auricles contract and pour the blood into the ventricles, and the ventricles expand. That the second sound is in a measure due to the shutting back of the aortal valves, is pretty certain, from the experiments made on animals, by thrusting a needle with a hook on the end into the aorta, and hooking back the valves so that they could not act, when the second sound vanished; but on the release of the valves, *was immediately heard again*. The physician is supposed to have a thorough knowledge of all the sounds of the heart, and as far as possible of the cause of each sound; and with such knowledge, when any deviation from the natural sounds occurs, he can recognize the origin of it, and where the trouble exists; and then his knowledge of general medicine is brought into play, to enable him to remove the cause of the disease as far as possible.

You will see how necessary a thorough knowledge of the action of the valves and the sounds of the heart is to the physician; and a person unacquainted with the mechanism of a watch might as well try to repair one, as a physician to attempt to treat diseases of the heart successfully without a proper knowledge of the sounds,

Plate 4.



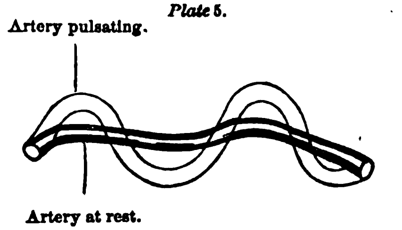
The upper surface of the heart with the auricles dissected away. The upper surface of the partially closed valves is seen. 1–2, the tricuspid valve and opening of right ventricle. 3, the mitral valve and opening of left ventricle. 4–5, semilunar, or half-moon-shaped valves of the pulmonary artery and aorta. These vessels are also represented as dissected away.

and action of the organ. In both cases the result would be about the same. Plate 4, with this paper, will show the situation of the valves, and the manner in which their edges come together.

Number of Contractions of the Heart and Pulse.

The reader will understand, I suppose, that *every* contraction or "beat" of the heart is attended by all the phenomena of sounds, etc., that I have described, and that the "pulse" which the physician feels for at the wrist (as the most convenient place) is the continued wave or impulse of the blood commenced at the heart and continued through the artery. The vessel is partially lifted from its bed by the impulse, and the movement is felt by the finger of the physician placed over the situation of the artery. *Vide* Plate 5. Each

Plate 5.



It will be seen that the artery is partially lifted from its bed during the pulsation, and strikes against the tissues covering it.

beat of the pulse at the wrist indicates a contraction of the heart, so that if a pulse is beating seventy-five times in a minute, the heart contracts as frequently in the same time. The usual number of these contractions in a healthy adult is seventy-two per minute, but a marked deviation from this rule *may* exist without being indicative of sickness. For example, a dozen men will present themselves to an examining surgeon, and perhaps in that number of subjects the different pulses will range from sixty to eighty in the different individuals. At different ages it varies greatly. In infants shortly after birth it is found to be from one hundred and twenty to one hundred and forty in the minute, in children of three or four years it is about one hundred, and in the healthy adult it usually ranges between seventy and eighty; but in all these cases it may vary somewhat from the usual standard, without any *disease* existing. It becomes less frequent with advancing years, falling as low as fifty sometimes, but in the very aged it occasionally increases to a degree approaching the rate of childhood. Increased frequency of the beat denotes increased frequency of the heart's action, and *vice versa.*

Effects of Disease on the Action of the Heart.

The frequency of the heart's action is affected by many causes beside disease. When the general system is depressed by cold, hunger, exposure to wet, and in diseases characterized by depression and prostration, as jaundice, and general debility, from almost any cause, the pulse is lowered in frequency and force; it is also affected in the same way by severe prostrating shocks, such as immediately follow a severe wound, a condition known to surgeons as "collapse." In concussion and compression of the brain, also, the pulse is very low.

Increased frequency of the heart's action is indicative of acute inflammatory diseases; hence it is found in nearly all fevers, in acute rheumatism, and in diseases of the lungs.

Effects of Exercise.

Physical exercise increases its frequency in a very marked degree: a boat's crew will return from a closely contested race with pulses beating thirty or forty beats in the minute more than when they started; and so running, or any kind of violent exercise calling for an unusual degree of exertion, has the same effect. You can easily satisfy yourself of the effects of muscular exertion on the pulse by counting it when lying down, and again on standing erect, when you will find it beating five or six beats faster in a minute than when lying down, and on walking swiftly across the room once or

twice, you will find it increased ten or twelve more beats in the minute.

Effect of Mental Emotion.

Mental emotion sends the pulse up into the high latitudes even quicker than physical exercise. Almost every one has at some moment of great anxiety felt his heart throbbing against his chest like a trip-hammer, so that he could not only *feel*, but *hear* it. If you could examine the pulse of a man on trial for his life, as he scans anxiously the faces of the jury returning into court with the verdict which decides his fate, you would find his pulse beating with double the force and frequency natural. The student awaiting the result of an examination or the award of a prize, and the gambler who has staked everything earthly on the turn of a card, will alike furnish examples of the power of mental anxiety of the heart. Slip your finger on the wrist of "the dear girl" who has been anxiously awaiting your coming, as she meets you at the door, and despite her assumed indifference you will find that the heart *will* respond to the emotions of the mind; or, to bring it nearer home, confess that your own heart has been set going "pit-a-pat, pit-a-pat," by the "mischievous god Cupid," and I think you will no longer deny that the mind has a great effect on the heart's action. But mental emotion does not always *increase* the heart's action, sometimes having a directly contrary effect. Every one knows the effect of the sudden communication of sad intelligence; the heart seems to be paralyzed, its functions are nearly suspended for a time, and the person falls as if dead — having fainted. Actual death has been caused by the sudden receipt of exciting news. The heart might undoubtedly be ruptured from such a cause, and Shakespeare seems to entertain some idea of this kind, when wishing to convey an idea of Cæsar's sense of the ingratitude of Brutus, he says: "Then burst his mighty heart." There is a popular recognition of the effect of the mind on the heart, in the expressions "broken heart," "warm-hearted," etc., in such common use. Of course the truth is that the heart is affected by emotions, etc., only secondarily through the brain and nervous system. Physicians always recognize the liability of the heart to be affected by mental emotions, particularly in invalids, and when entering a sick room avoid, or should avoid, all possible means of exciting the patient by too sudden or unpleasant inquiries, or by unseemly haste, and attendants should observe the same rule.

Exciting Causes of Diseases to be Avoided.

Persons who have any reason to suspect that they are subject to disease of the heart, should scrupulously avoid any exciting cause, either mental or physical, should not engage in any occupation entailing exciting exertions upon them, and should avoid the use of tobacco, and stimulants of all kinds, as a slight affection of the heart, which might otherwise cause but little trouble for a long series of years, will speedily be developed into active existence, by the frequent repetition of exciting causes.

Action of Heart affected by Medicines.

The action of the heart is very readily affected by drugs of different kinds. Alcohol, ammonia, and stimulants of all kinds increase it, and narcotics, like opium and tobacco in large quantities, decrease its frequency; and physicians very often take advantage of these properties of different medicines, to enable them to control the action of the heart when disordered.

General Indications of the Pulse.

From the above remarks on the pulse, the reader can gain some general ideas which may be of service, when removed from medical assistance or advice. If you find a person with a pulse beating from ninety to a hundred times in a minute, joined with a hot and flushed skin, parched tongue

and lips, headache, etc., you may be pretty sure that it is the commencement of a "fever;" and if, added to these symptoms, there is difficulty in breathing and pain about the chest, it is probably some inflammatory disease of the lungs. While on the contrary, a slow pulse of from fifty to sixty, accompanied with coldness of skin and extremities, indicates some disease, attended with great prostration and debility. In certain cases, great debility is attended with a small, tremulous, but very rapid pulse of a hundred and ten to a hunered and thirty. This latter is one of the most dangerous signs that can exist in connection with a disease.

There are other characteristics of the pulse which are not of interest to the general reader, but which are of value to the physician, as being indicative of the character of disease; but the distinctions between these different characteristics are altogether too nice to be understood by the general reader, so that when the pulse does indicate any marked deviation from the natural standard, it is better to consult a physician than to decide for yourself.

The rate of the pulse was at one time thought to be the most prominent symptom to be considered in connection with a disease, and it is still regarded as a very important one, but is always considered in connection with other symptoms, on account of the great variety of causes by which it is affected.

Preparation of Potatoes. — The following is given as a method of preparing an extract of the alimentary portions of the potato: — The potatoes, after being washed, are digested in water not hot enough to render the starch of a gelatinous consistency, but sufficiently so to soften the fibrous portions of the tuber, and allow of the solid alimentary portion being retracted with the water by mechanical pressure. This result, it is said, is produced in from six to ten hours by digestion in water heated to 104° to 140° Fahrenheit, the exact heat, as well as the duration of the digestion, depending upon the state of maturity, and the natural softness or hardness of the cellular tissue of the potato. In general, eight hours in water heated to about 120° is said to be sufficient for the purpose. When the digestion is completed, the potatoes are allowed to cool, or, what is better, are plunged into cold water; they are then reduced to such a condition that all but the cellular matter may be squeezed out without diffculty by means of any kind of press, the pressure being slight at first and gradually augmented; this second process occupies three, six, or even twelve hours, according to the degree of flexibility given to the tissues by the previous digestion and refrigeration.

The liquid thus obtained is boiled and condensed by evaporation until it assumes the consistency of Liebig's extract of meat, to which it bears considerable resemblance; like that preparation, it is almost incapable of decomposition in contact with air under an average temperature, and an ordinary amount of moisture, and consequently can be preserved with little difficulty.

Horse-flesh as Food. — In Paris, from the 9th July, 1866, when the first horse-flesh butchery was opened, to the 31st December in the same year, 902 horses (a few mules and asses being included) were slaughtered, and their flesh averaging for each about 440 lbs. in weight, gives a total of about 180 tons; in 1867, the total consumption of this kind of meat rose to 430 tons; and in the following year it amounted to rather more than 480 tons. In these two years and a half the totals were 5,475 horses, yielding 1,095 tons of meat, without including the livers, tongues, hearts, etc., which were also used as food. The price of horse-beef in Paris is less than half that of ox-beef. The returns for the rest of France are not complete, but judging from partial accounts, and according to the number of towns in which this kind of meat is used, the committee believes that the total consumption amounted, in 1868, to 2,000 tons.

ON POISONS.

BY F. S. BARFF, M.A.

Third Paper.

WHAT is the treatment to be pursued in cases of poisoning by corrosive sublimate? Fortunately, it readily forms insoluble compounds with albumen. Albumen is therefore said to be its antidote. When a person has taken this poison, either by accident or design, or has had it administered with intent to destroy life (this rarely happens, from the difficulty of concealing its peculiarly nauseous taste), the first thing to be done is to freely administer white of egg. M. Thenard, the great French chemist, during his lecture, by mistake drank a strong solution of corrosive sublimate. He immediately discovered what he had done, and made the fact known to his class. The excitement produced was intense. He told them to bring him eggs. Eggs were sought for in every direction; in a few minutes large quantities were obtained by his anxious pupils, and thus the life of this eminent professor was saved. This happened shortly after the discovery of the effects of albumen on corrosive sublimate were discovered by Orfila. A case is also recorded of a gentleman who, by mistake, drank a portion of an alcoholic solution of this substance. He was so alarmed by the taste that he did not finish it. He was, however, seized with a sense of tightness in the throat, burning at the stomach, and purging. Orfila saw him when the symptoms had acquired great severity, having lasted two hours. The administration of white of egg caused a mitigation of his sufferings, and he ultimately recovered.

It is asserted by Peschier, that the white of one egg will render four grains of corrosive sublimate innocuous. Orfila administered to a small dog twelve grains of this poison; after it had acted for about eight minutes, the whites of eight eggs were given; it vomited several times, the pain ceased, and in five days it quite recovered. The white of egg should be beat up in a little water, and it should be given freely at intervals. A woman, named Rose Maney, poisoned herself with corrosive sublimate; various remedies were tried, but with little benefit. The morning after the poison was taken, the whites of two eggs, beaten up with a little cinnamon water, were given; this dose was repeated every half hour, until she had taken the whites of twelve eggs, when she began to feel easier; and, during the time she had been under this treatment, she had only vomited twice, and other unfavorable symptoms began to disappear. The white of egg treatment was continued until she had taken the whites of thirty-two eggs. She went on progressing favorably, and was eventually cured. Here the albumen was not given till many hours after the poison was first taken. There is another substance which is considered to act as an antidote, namely, gluten. Its properties were discovered by Taddei, an Italian chemist. In administering it, it is usual to mix the gluten with soap, so as to hold it in suspension. If eggs are not at hand, gluten may be thus used. It is easily prepared by kneading dough, made of flour and water, under a tap from which the water is pouring in a small continuous stream; the starch is washed away from the flour, the gluten remaining behind; and this should be rubbed up with soap, and rinsed with water. From experiments made by Dr. Devergie, it does not seem to be as effective an antidote as albumen, yet the experiments of Professor Taddei show that it forms insoluble compounds with corrosive sublimate, so as to perfectly precipitate it from a solution of that salt. His experiments on animals are on the whole satisfactory, and a case is recorded of the cure of a man, by its means, who had

taken seven grains of corrosive sublimate by mistake for calomel. If albumen and gluten cannot be obtained, milk may be given, as it contains casein, which is similar in its action to albumen. Iron filings mixed with gold dust or gold leaf cause the decomposition of corrosive sublimate with precipitation of metallic mercury, which is not a poison; and even iron filings alone produce the same effect. These substances have been tried with excellent results on animals. Opium has the effect of counteracting the action of this poison, but it would be dangerous to administer it in sufficient quantities. This property is due to the meconic acid which it contains. The action of meconic acid is to form insoluble compounds with metallic oxides, when it is combined with a substance such as morphia, forming a salt which is soluble. In most cases of poisoning, immediate resort is had to the stomach-pump.

It should, however, be used with the greatest care, if employed at all, in poisoning by corrosive sublimate, the action of that substance being to corrode rapidly the stomach and the passage which leads from it to the mouth, which is called the œsophagus. Every effort should be made by means of emetics to secure the ejection of all matters from the stomach, and these should be given with whatever other antidotes are employed, whether albumen, gluten, milk, or iron filings.

The metal mercury is not a poison, that is, when taken in the liquid state. Dr. Taylor mentions that a person, who suffered from obstinate constipation, took as much as half a pound of fluid mercury in five days, without its producing bad effects. Dr. Daniel Turner, who lived in the reign of Charles II., in his "Treatise on Diseases of the skin, and the Antient Physicians' Legacy Impartially Surveyed," in speaking of quicksilver, says: "In King Charles II.'s reign, I very well remember, though it is about fifty years past, a physician knighted by that prince, whose name I can sometimes recollect, though not at this moment, encouraged it much, who lived retired somewhere about Edmonton, and when the villagers round coming to consult him, especially on their children's diseases, he advised a thimbleful of quicksilver to be given them every morning for a month." The beauties of the court of King Charles II. used to take crude mercury as an alterative; and it was common to take a teaspoonful, morning and evening, to beautify the complexion, to remove a freckle, or to give a pearly lustre to the skin. It was found that the mercury passed unchanged through the system, and that, too, with considerable rapidity. But those who are exposed to the action of *vapor* of mercury, or who are much engaged in handling it, often suffer from it very materially. Its effects on miners are often very severe. Dr. John Wilkins, in the "Philosophical Transactions," in the year 1666, in which he describes the quicksilver mines at Priuli, in the Venetian territory, says that, although the miners stay under ground only six hours at a time, all of them die hectic, or become paralytic. He saw there a man, who had not been in the mines above half a year before, so full of mercury, that on putting a piece of brass in his mouth, or rubbing it between his fingers, it immediately became white like silver, and so paralytic was the unfortunate man that he could not with both his hands carry a glass half full of wine to his lips without spilling it — though the doctor quaintly adds, he loved the wine too well to throw it away. Shaking palsy, and salivation, appear to be the consequences of exposure to the vapor of mercury. Barometer makers and looking-glass silverers are both liable to these affections. Dr. Christison relates a case of a barometer maker and one of his men who were exposed one night, during sleep, to the vapors of mercury from a pot on a stove in which a fire had been accidentally lighted. They were both most severely affected, one with salivation, which caused the loss of all his teeth, the other with shaking palsy, which lasted to the end of his life. Chemists who have to work much with metallic mercury often suffer from the effects.

The medicine known as calomel, which is a chloride of mercury, containing less chlorine than corrosive sublimate, has been found to act as an irritant poison. The poisonous effects of calomel have been attributed to the presence of corrosive sublimate, an impurity not unlikely to occur from the method of its manufacture. It has been stated that corrosive sublimate is made by heating mercuric sulphate with common salt; calomel is made in the same manner, only that an equivalent quantity of mercury is added. Both substances are volatile, and it is therefore very possible that some corrosive sublimate might pass over with the calomel. However, such care is taken in the manufacture of this important drug, that this impurity is rarely found in it. Dr. Christison examined ten specimens, and found but the merest trace of corrosive sublimate in them.

Two cases are mentioned by Hoffman in which fifteen grains of calomel proved fatal to two boys, aged twelve and fifteen. One of them had vomiting and tremors of the hands and feet, and died on the sixth day. The other died after suffering from extreme anxiety and black vomiting. It is clear that very large doses of calomel may be taken without producing poisonous effects. In the East it is used not only as an irritant, but in large doses a sedative. In yellow fever it has been given in doses of from ten to twenty grains four times a day. A strong, healthy girl took an ounce of calomel by mistake, thinking it was magnesia; it was mixed with milk. After some hours the mistake was discovered. Emetics were given. She had previously suffered slightly from nausea and faintness. After a time severe griping pains set in, and there was much tenderness of the abdomen. In four days she recovered, and strange to say, she escaped salivation. Since calomel has acted as a poison, it is necessary to notice the method of its action. Its effects are those of an irritant poison, though it may destroy life by causing gangrene of the mouth and throat. Chemically, calomel has some reactions different from corrosive sublimate. It is a dense white powder of a slightly buff tint; it is not soluble in water, neither in ether, nor in alcohol.

It will be well to notice briefly the other salts of mercury which have occasionally been used as poisons. The red oxide, mercuric oxide, which contains 200 parts of mercury and 16 of oxygen, is usually prepared by cautiously heating mercuric nitrate. It is in appearance of a scaly nature, and bright scarlet color; when heated it changes to a chocolate brown, and eventually becomes black; on exposure to air it recovers its red color again. If, however, the temperature be raised considerably, it is decomposed into oxygen and mercury, which volatilizes, and is condensed in the cool part of the tube in minute brilliant globules. This red oxide is used in medicine, generally as an ointment; it is also employed, mixed with fat, for the destruction of vermin which infest bedsteads. Several cases of poisoning by this substance are recorded; the symptoms resemble very much those which have been described as produced by other preparations of mercury. The quantity required to cause death seems to be large; thirty grains have been taken without producing serious consequences. The best treatment appears to be the administration of emetics and demulcent drinks with albumen or gluten. Cinnabar or mercuric sulphide, the black sulphide of mercury precipitated by hydric sulphide, when dried and heated, sublimes, forming the red sulphide; they are identical in their chemical composition. Cinnabar is the principal ore of mercury, it occurs crystallized in six-sided prisms.

The paint called vermilion consists of this sulphide artificially prepared. The methods of preparation differ in different places, and with different makers, but all are the same in principle. Animals have been killed by its action, even when it has been applied to wounds. There is no instance on record of a human life having been destroyed by it. Mercuric sulphide contains mercury and sulphur in the proportion of 200 parts of mercury to 32 parts of sulphur, by weight.

Turpeth mineral is a yellow basic sulphate of mercury. But few cases of poisoning by this substance are recorded. It is obtained by acting on the normal white sulphate with water. It is very heavy, and has an acrid taste. When heated the mercury is sublimed, and sulphurous acid is given off, which may be detected by its smelling like burning sulphur. If boiled with caustic potash, potassic sulphate is formed, and mercuric oxide precipitated. The sulphate can be detected by its giving a white precipitate with a soluble baryta salt, which is insoluble in all acid liquids. The mercury can be detected by the reactions already described.

Mercuric cyanide has been already alluded to. Cases are on record of persons having been poisoned with this salt. It is easily detected by the action on it of heat; it is decomposed into mercury and cyanogen gas; the cyanogen burns with a very beautiful rose-colored flame. It is hardly neccessary to mention the nitrates; the action of mercuric nitrate on the human frame is the same as that of corrosive sublimate.

Poisoning by copper is very rare, except as the result of accident, yet very serious effects have been produced by taking salts of this metal. It is largely used in the manufacture of saucepans and cooking utensils, and was, not many years ago, put into pickles to increase the green freshness of their color. It is often employed by confectioners for coloring their sweetmeats, and the decorations they use for ornamenting cakes. It is found in combination with arsenic in some of the green colors of the paint-box; and the colors known as verdigris and verditer are preparations of the acetate and carbonate of copper.

The salts of copper are rarely used by the poisoner, because they have a deep and well-marked color, and a very acrid taste. The general color of cupric salts is blue or green. Blue stone (blue vitriol), the sulphate is of a bluish green color, the nitrate is of a deeper blue, and the chloride is green. The metal copper does not seem to be poisonous, but, when taken into the stomach, it meets with acid liquids, by which it may be oxidized and dissolved. Dr. Taylor relates the case of a boy who was engaged in printing gold letters,—the gold employed is an alloy of copper,—this substance reduced to a fine dust, floats about in the air; the boy inhaled these particles, and on the third day was seized with vomiting of a green colored fluid, with heat and constriction in the œsophagus, pain in the stomach, loss of appetite and rest, and with a severe itching of the skin in those parts covered by hair, which parts were changed to a deep blue color. About twelve persons engaged in the same employment were similarly affected. The use of copper cooking utensils is not objectionable, if they be kept clean, but certain substances employed in cooking have a tendency to to dissolve the metal. Oils and fatty matters have this action. It has been said that they must first become rancid, but this is not the case. Fresh butter has been found to act on copper, and the surface of a copper-plate has become blackened in twenty-four hours, when covered by that substance, and the butter itself has become green; this only occurred when it was in contact both with the air and the copper. One therefore concludes that the presence of air is necessary to produce this result. Dr. Christison says that, in fresh hog's lard, he has found that the whole lard in contact with the copper becomes blue, even to a depth to which the air can scarcely reach. Hot oil acts in a similar manner; one knows the effects produced in old-fashioned brass lamps, where the oil which remained in the receiver for the drippings, was almost invariably green. Vinegar dissolves copper, and the vegetable acids generally, in the presence of atmospheric air. It seems to be necessary to keep the metal covered with the fluid, and then these effects are not produced. It is, however, most dangerous to allow any acid substances that are to be used for food, to stand for any length of time in copper vessels. Preserves are usually made in copper or bronze pans; these should

be emptied out as soon as the operation is completed, and the pans should be well cleaned, as the fruit acids would inevitably oxydize and form poisonous salts with the copper. A case is recorded in *Wildberg's Practical Manual*, of a servant who left some sour krout, for only two hours, in a copper pan which had lost its tinning. Her mistress and a daughter, who took the cabbage at dinner, died after twelve hours' illness, and Wildberg found the cabbage so strongly impregnated with copper, that it was readily precipitated on iron. Any amount of carelessness in the use of copper vessels, on the part of servants, may be attended with very serious results, so that it seems almost advisable to abandon their use in favor of iron ones, which are not liable to these objections. A case is related by Gmelin, of a whole community of monks who were attacked by a violent disease; the symptoms were those which result from copper poisoning. On inquiry, it was found that every utensil in the kitchen and dairy was made of copper. —*From an article by F. S. Barff.*

HOW TO COOK TOUGH POULTRY.—Madame Miau is, what may be called, an Anglo-French authority on culinary operations. At least she was born in England, educated in France, went back to England, studied, talked, cooked, and ate a great deal in both countries. A friend in extremity once asked her, what she could do with "a miserable half-starved chicken that the dogs had killed?" Her answer was prompt, and encouraging to those mistrustful people who are compelled to dine in doubtful eating houses. "Truss it neatly," Madame Miau replied, "stuff it with sausage and bread crumbs; mix some flour and butter, taking due care it does not color in the pan, for it must be a white roux; plump your chicken in this, and add a little water, or soup if you have it." We are told besides to put carrots cut in half, tops of celery, chives, bay leaf, parsley, etc., then "cover close, so that all air may be excluded, and keep it simmering two hours and a quarter; it will turn out white and plump; place the vegetables round it, stir in an egg to thicken the sauce, off the fire, and your dish will make you blush." Without actually snatching half-starved chickens from the mouths of dogs, might not Madame Miau's instruction render many a tough old bird palatable?

HOW TO COOK VEGETABLES.—It is observed that a meal from vegetables is not satisfying. I have found it frequently happen that the persons who thus objected, did not know even how to boil a vegetable. The rule is simple, but must never be forgotten. Every kind of vegetable intended to be served whole should, when put to boil, be placed at once in boiling water; and this applies especially to potatoes, and vegetables from which the outer cover has been removed. Now it often happens that potatoes, etc., are, to save time, placed in cold water and left to boil gradually. It is just this which allows the nutritious matter to escape, and renders the meal unsatisfying. When, on the contrary, the water boils from the moment the vegetable is immersed in it, the albumen is partially coagulated near the surface, and serves to retain the virtue of the vegetable. The reverse is, of course, the rule for making soup, or any dish from which the water will not be drained. By placing the vegetables in cold water the albumen is slowly dissolved, and actually mixes with the water—a process most necessary for the production of nutritious soup. It is to be hoped that those who have a special need for the most their money can produce, will learn, in whatever haste they may be, not to boil all the albumen from their potatoes, reserving for their meal only the starchy matter.

CONSUMPTION.—Prof. Virchow concedes, as far as the children of consumptive parents are concerned, that the complaint is not invariably transmitted to them, but are almost always delicate; and if they keep clear from phthisis themselves, may transmit the predisposing tendency of it to their children.

NEAR-SIGHTEDNESS.

BY HENRY M. HURD, CHICAGO.

THE increase of near-sightedness among the American people is not due so much to physical degeneracy, as some cheerful philosophers would have us suppose, as to overwork. The average American citizen is sent to school too early, studies too many hours, and gives himself little recreation even in childhood. With his hurried school days over, at the age of sixteen or seventeen he rushes into business and strains every nerve, working early and late to get what is known as a "start." Once started, and fairly in the business, he continues there until old age or bodily infirmity compels him to give place to others equally unsparing of health and energy in business pursuits.

In all this fevered haste and ever-to-be-admired energy, overtasking body and mind, no organ of the body is more severely taxed than the human eye. The mind may go a-pleasuring with the body, but the eye knows little rest. The most determinedly idle man must read the daily paper, the last new novel, or very likely a "diamond edition" of some popular author. Whether business or pleasure engrosses the mind, the eye, in this age of cheap literature, must be ever at work. Manifold optical defects — of which one of the most prominent is near-sightedness, result in too many instances from this constant tax upon our sight. What, then, is the trouble with the eye in near-sightedness, short-sightedness, or myopia,— for they are all the same? Simply an inability to see distant objects distinctly, any object being termed *distant*,— rather arbitrarily, it must be confessed,— when more than five feet away. When you look at this page several zones or belts of more or less distinct vision lie in front of the eye, all of which may be easily defined. If the page is brought nearer than ten inches, presupposing that you have ordinary powers of vision, the forms of the letters grow indistinct, and are only to be seen by a conscious effort. If, on the other hand, you remove it more than four or five feet, the letters again become obscure, and fade away into dim air. The dominions of the eye may be mapped out, then, something like this: first, a space of about ten inches in which the eye sees indistinctly from its very nearness; second, a space commencing at the outer boundary of the first — at what is technically termed the "near" point, and extending four or five feet, to a limit known as the "far" point of vision; this forms the territory of distinct vision; and finally, the whole region beyond this constituting a *terra incognita*, as far as objects no larger than these letters are concerned. Similar boundaries could be assigned to our perception of larger objects, relatively greater in extent, to be sure, but each having its zone of distinct, indistinct, and impossible vision, notwithstanding. All clear, useful vision, therefore, must take place between the "near" and "far" points above mentioned. In the visual field of the *near-sighted eye* these different zones are just as well marked as in the former case, but are brought much nearer the eye. With type of this size the zone of indistinct vision may be only four or five inches across; that of distinct sight, five or six inches more, while all beyond is wrapped in darkness. In a near-sighted eye, then, the "near" point is placed very near the eye, and the "far" point not very far removed, while the region of no-vision beyond is very much increased. Hence comes the necessity which near-sighted people have of getting themselves very near any object they wish to see. If the unfortunate victim of this defect be a boy at school, he scandalizes his teacher by his wretched habit of stooping over his desk, furnishing the counterpart of that illustration which used to adorn the pages of an elementary work on Physiology, designed to show the pernicious effects upon heart, lungs, spine, and stomach, of improper posi-

tion while at study. I wonder if that picture is still retained portraying a youth emaciated in the extreme, with stooping shoulders, flattened chest, protruding chin, and neck of swan-like length and flexibility? How ridiculous a figure he cuts compared with the round-chested, rosy-cheeked, erect, handsome youth on the opposite page, who evidently had no such depraved habits about him. That this unfortunate youth was near-sighted I haven't a doubt,— with such life-like reality is he drawn.

Near-sightedness does not necessarily depend upon any defect of vision itself, — the eye seeing everything perfectly well, provided objects be brought near enough. The fault is in the construction of the eye, and is due to a want of proportion between the different parts, as will be seen farther on.

It was once supposed by scientific men, and the belief is still a popular one, that this defect depended on excessive roundness of the eye, just as the far-sightedness of old age was thought to be due to an unnatural flattening. Both of these time-honored notions have been of late overturned by certain meddlesome men, who, having little regard for plausible theories, have shown by actual measurements that no such roundness or flatness exists. Without going into the hidden mysteries of refraction and accommodation, it will be sufficient to say that near-sightedness is due to an elongation of the eyeball, whereby the retina, — that nervous expansion which receives all images formed in the eye, and conveys them through the optic nerve to the brain,— this retina, I repeat, is situated so far behind its usual position, that only the images of objects near the eye are formed upon it. The eye, instead of being three-fourths of an inch in length, becomes an inch, or even an inch and a half, from front to rear. How is such a change of shape brought about? Sometimes it is hereditary, but more often the result of injudicious use in early life, when the tissues of the eye are soft and yielding, unable to withstand pressure. When the defect is hereditary it is generally due to an imperfect development, or arrest of development of those outside structures surrounding the more delicate parts within the eye. If such an eye be now forced to do constant duty, being fixed upon objects near at hand, the muscles which control its movements will pull upon it from opposite directions, tending to lengthen it at its weakest point, which is always at the back of the eye. If, in addition to this, a stooping posture cause pressure to be made upon the vessels returning blood from the eye, an unnatural distension will result producing pressure from within, thus increasing the tension of its already weakened coats. By these means the lengthening out of the eyeball, and consequent increase of near-sightedness, will go on together, until the tissues acquire the firmness of adult life, and are able to resist farther pressure. Although its progress may thus be checked, the condition is permanent when once established. Hence the folly of supposing that near-sightedness will disappear as age advances. In those exceedingly rare cases, only when it is due to excessive refraction, is there any prospect that old age will produce any amelioration of the defect.

The only remedy is in the use of concave glasses, which are of service because they prevent the rays of light which enter the eye from coming together to form an image before they reach the retina—as they would otherwise do. They simply cause the images of objects to be formed farther back in the eye, so that they may fall upon the retina. Thus they give a view of distant objects, although they diminish somewhat their size.

Many near-sighted people are averse to using these crutches for the halting eye, from an erroneous notion that permanent injury to the eye will result from their use. Such is rarely the case; while, on the other hand, very often irremediable harm is done to the eye by delay in putting them on. In slight degrees of myopia they generally need not be used. But if it be discovered that the eye is getting more myopic without them, if those uncomfortable sensations arise denoting an over-

tasking of the eye, then they should be at once assumed. Generally, however, in these cases much benefit will arise from systematic exercise of the eye in looking at objects a long way off, and what is even more important, by abstaining from every occupation, whether study or otherwise, requiring excessive use of the eye for short distances. The keenness of vision enjoyed by the sailor or the Indian upon our Western plains, proves how the eye may be strengthened by the right sort of use. That rare old astronomer, Tycho Brahe, lying flat on his back in his island observatory in the Baltic, and studying the movements of the constellations with his own unaided eye, teaches us a notable lesson in the capacities for vision existing in every eye, only to be developed by such systematic training. All moderately near-sighted people, therefore, should not fail to make diligent trial of these disciplinary measures. But suppose the degree of imperfection of vision already so great as to preclude their use, it is manifestly absurd to think of training an eye for distant vision with any hope of satisfactory results, when it can scarcely see the width of a narrow street. And yet if such an eye be left to itself, it must progress from bad to worse. The effort which it makes to obtain distinct, sharp vision, produces universal pressure upon its coats by the action of the above-mentioned muscles, resulting, at last, in a protrusion of the posterior part of the eyeball. This in its turn interferes with a proper performance of the functions of the retina, and thus the two conditions react upon each other, much to the detriment of vision. All this is prevented by use of the proper glasses, which take away all necessity for overstraining the eye, even in looking at minute objects. Such glasses should be of as low power as will give distinct vision, and as a general rule should be worn constantly, the latter injunction being generally superfluous to the wearer who has once learned their virtues; for they open a new world to him, of whose existence he scarcely dreamed. He learns, by their kindly aid, to recognize the friends he unwittingly used to pass in the streets; to know the countenance of public speakers in the pulpit or on the rostrum, when before he only saw dim outlines; to appreciate the beauties of a landscape spread out before him; without them the face of nature, to his view, consists of a few objects standing out of the general gloom with more or less distinctness, but all beyond and around is wrapped in misty darkness; *with* glasses he is brought out of fog and darkness into pure sunlight.

The majority of near-sighted people need not, although in all probability they will, go on step by step to the alternatives of spectacles or no sight. If proper prophylactic measures were taken in childhood, for then the mischief is generally done, its progress might easily be prevented. A child manifesting any symptoms of myopia should never be compelled to sit at a low desk, nor to study from a book whose type is not fresh and clear, nor to use the eyes for a long time continuously, especially by artificial or imperfect lights. Some figures recently published in Germany show pretty clearly that the seeds of the rich harvest which spectacle makers are destined to reap, are sown in early youth. From them we learn that in the public schools the percentage of near-sighted scholars increases from one in a hundred in the primary schools up to 10 in the intermediate, and 21 in the gymnastic and polytechnic schools. Thus prophylactic procedures should therefore be persevered in, until adult life brings firmness and stamina to the eye as well as to other parts of the body.

Near-sightedness, for the reasons stated in the beginning, is pre-eminently a defect belonging to civilized life, and is much more common among those engaged in study, or in some of those mechanical pursuits requiring close attention, as engraving, watch-making, and the like.

Literary men are especially liable to become near-sighted. Samuel Johnson, diving with his fingers into the various dishes at dinner with a view to ascertain the nature of their contents, spilling his food up and down his waist-

coat, and rudely jostling those in the street whom he failed to see in time to avoid, was evidently not far from it.

Neither was Thackeray nor Charlotte Brontë, nor Fredrika Bremer, nor is Hans Christian Andersen, nor Wilkie Collins, nor "George Eliot," nor many others whose names are household words throughout two continents.

PRESENCE OF MIND.

FROM a pair of scissors upwards to the System of the Universe, every agency, moral or physical, seems to be compounded of two antagonistic forces, controllable and performing correctly the duties assigned to them as long as they work in unison; but uncontrollable, and prone to run into excess of their functions, if separated from each other.

Take away the force of gravity, and centrifugal force uncontrolled would scatter us in fine dust through space. Abolish one of the constituent parts of any well-organized government, and the result, in a moral sense, would probably be pretty much the same. Even the blade of a pair of scissors won't work without its fellow. Nor is the brain an exception to this rule. An eminent philosopher (Dr. Richardson), still living, in experimenting recently on animals, with the object of testing the comparative value of various anæsthetics, discovered that at least two antagonistic forces reside in the brain: one having its abode in the anterior and upper portion (the cerebrum), the other in the lower and posterior part (the cerebellum). In his experiments, he observed that if the cerebrum of an animal be rendered insensible, and its powers thus temporarily destroyed, the animal is immediately impelled to rush forward; on the other hand, the cerebellum being paralyzed, retrograde movement is the result. Thus he accounts for that impulse which many people feel to precipitate themselves from a height: the cerebrum, which contains the thinking and directing faculties, under such circumstances becoming paralyzed — dizzy — and so the control which it normally exercises over the cerebellum being partially removed, the influence of the latter declares itself.

The learned professor having opened the gate for us, we may walk in and observe for ourselves. Many things come to our recollection which we can now account for by this double brain force. We can comprehend why that partridge dashed madly forward after the fatal charge struck him; and why the other, although flying at the same speed, fell back in the air like a tumbler-pigeon, fluttering still backward to the ground. If we take up the one, we find a grain of shot has pierced the skull a little above the eyes; and we see the death-wound of the other at the back of the head. We can now understand why those overcome with fright so frequently rush into the danger they wish to avoid. Nor need we confine ourselves to examples of a purely physical nature. We may place in the same category the bashful man who talks nonsense when he should hold his tongue; the awkward man, who only is awkward because he is nervous — the directing power of his brain is in abeyance — and the passionate man, whose words and actions are uncontrolled by his reasoning powers. In a word, we can trace half our foolish words and actions to a want of equilibrium between these two forces that inhabit our brains, and it is only when the balance is correct that we are fit to govern ourselves.

Presence of mind is the popular term to express this mental equilibrium.

The question has been frequently discussed in social circles whether men or women are most prone to lose their presence of mind. Lucy, just seventeen, says: "Oh, men, to be sure. Why, self-possession is an attribute

almost peculiar to women; a young girl entering society is quite at her ease, while a young man is sure to be awkward and nervous. See how we get out of a scrape: never at a loss for an answer. A man would stutter and mutter, and get deeper into the mire." "Yes, but," says Tom, who is just home from school, and not much troubled with nerves — "just look at you girls how you scream; if your life depended on silence, you'd betray yourselves by a scream." Then the ladies reply: "Oh, we don't pretend to be as brave as men." And so the question remains unsettled. Lucy, no doubt, is correct, nor is Tom less so. Perhaps the fairest arrangement would be to grant the weaker sex pre-eminence in the absence of physical danger; and yet, on the other hand, instances of calm thought and deliberate action of women under trying circumstances are so numerous, that they can scarcely be held as merely exceptions to the rule. Amongst the tales of shipwrecks are recorded noble instances of presence of mind amongst women in the most appalling danger. What could be more heroic, for instance, than the conduct of the women on board the ill-fated *London?* Indeed, it is generally in circumstances of comparatively trifling peril that the balance of the female mind is disturbed — when, as Tom says, they shriek.

The following story, exemplifying remarkable presence of mind in an old lady, has never been in print. It is perfectly true. This old lady ——But stay, she shall tell the tale herself, as she used to tell it to me, her little nephew.

"You know, my dear, I was living in the country at the time, my little grand-daughter being my only companion. We had two female servants and a man-servant, but he did not sleep in the house, but in a loft over the stable. One night, late in the autumn, I went up to bed at my usual hour — nine o'clock. I was early, you see, for Fanny was only seven years old, and I did not care to sit up alone after she was in bed; besides, by the time I had read my chapter, and said my prayers, and undressed myself, it was fully ten o'clock. Well, on this particular night, I went up as usual. I first undressed the child, and put her into bed; then I made myself comfortable, and got my Bible, and sat by the fire — it was very cold for the season, and I kept a fire in my room — and after I had finished my chapter, I knelt down to my prayers: my position as I knelt was with my back to the fire, and my face toward the bed. I had scarcely got on my knees, when I caught sight of something unusual under the bed; on looking more attentively, I could see that it was a man's foot. My first impulse was to scream, but fortunately I restrained myself; and the first shock over, I was able to think. I had no doubt that it was a robber, and that if he found that he was discovered, he might not stop short of murder. I dared not go to bed, and pretend I did not know he was there; and yet, how to get the child and myself out of the room without exciting suspicion, I could not imagine. These thoughts passed through my mind in half the time I have taken to tell you; and I was about to rise from my knees, when I suddenly recollected that my doing so at once might in itself excite suspicion; for aught I knew, it might be some one who knew my habits, perhaps even my own man-servant, though I had no reason to suspect him. At all events, I determined to remain some time longer, as if engaged in my devotions. I need not tell you that I could not give much heed to my prayers, but I did ask for protection and guidance. You know, dear, that I am a slow, methodical old woman, and that I seldom get through my prayers in less than a quarter of an hour, so I now determined not to stir for at least ten minutes. What an age those ten minutes seemed! I never took my eyes off the foot until just before I arose, when it was slowly withdrawn out of my sight. When I saw it move, I felt faint with fright, for I feared lest the man had suspected, and was going to come out; however, he remained quiet, and then I got up from my knees. The next thing to be done was to get the child out of bed

without causing any alarm. Speaking as calmly as I was able, I asked her if she were awake; she answered in rather a sleepy tone, but aroused herself as I continued speaking. "Fanny, dear," I said, "I have left my keys below stairs"—I felt a little uneasy at the falsehood, but I hope it was not wrong—"and I cannot undress without them: I don't like going down by myself; would you mind getting up, my love, and coming with me?" She jumped out of bed in a moment, and, having wrapped a shawl round her, I pushed her before me; then, when opening the door, I managed to take out the key and put it in on the other side. I then shut the door, and locked it; and then, my dear, I could no longer control myself—I shrieked several times at the top of my voice, and fainted. After all, poor Joseph, the coachman, was faithful, for one of the maids called him in, and, armed with a pitchfork, he secured the robber, who was trying to get out of the window."

Here was an instance of retention of presence of mind in the face of apparent danger, and the loss of self-control when the danger had passed. Habit has much to do in the preservation of the cerebral equilibrium, as we see, for instance, in the sailor who goes aloft without feeling any inclination to come down "by the run," and in the matador in the bull-ring, whose fate depends on his coolness. Education, also, no doubt, assists in keeping the brain in order. Yet here again, we have numerous instances of presence of mind in the humbler and less educated ranks in life. One example—also a true story—will suffice. Caroline G——, a good-looking, finely proportioned young girl, lived as lady's maid with a fashionable widow, rather *passé*. One evening, after having assisted at her mistress's toilet for a dinner-party, she amused herself, before putting away the various articles scattered about the room, in trying on a pair of silk stockings and dress shoes belonging to her mistress, and, having done so, she viewed her well-turned limbs with complacency, saying aloud; "There's a leg for a stocking, and there's a foot for a shoe." Having satisfied herself as to their symmetry, she divested herself of her borrowed plumes, put the room to rights, and awaited the return of her mistress, whom she saw into bed. That was the last time she saw her alive. She was found in the morning murdered in her bed, the jewel-case and plate-chest broken open and robbed. The robber and murderer had left no trace by which he could be captured, and in spite of the most diligent search, escaped. Three years after, Caroline was engaged in a similar capacity by a lady who took her to Paris. She had almost forgotten the murder, and, if she thought of it, it was not with any hope of discovering the criminal. It happened that she was walking in one of the public promenades one afternoon, when, as she passed a group of men, she heard these words: "There's a leg for a stocking, and there's a foot for a shoe." In a moment the events of the evening before her mistress was murdered flashed on her memory. And now for her marvellous presence of mind. Pretending not to have heard anything, she glanced sideways at the group of men. She saw there were three, but she could not tell which of them had spoken. She walked slowly past them, then she stopped in an undecided manner, and finally turned back, and, walking up to them, she asked to be directed to a certain street. As she expected, all of them had a word for her, and amongst the voices she easily recognized the one that had just spoken. Their language and looks were both very free, but she only told them that they were very impertinent, and that she would get the information she wanted from the first gendarme. She thus averted suspicion if they watched her speaking to a policeman. The next difficulty was how to inform a gendarme what she wanted: she had been only a fortnight in France, and scarcely knew a word of French. She, however, carried a pocket-dictionary with her, to assist her in making purchases, and as a means of acquiring a little French. Going

over to a bench, she sat down, and, searching through the dictionary, found the words she wanted, and she then wrote them with a pencil in the fly-leaf of the dictionary. The sentence ran thus: *Gendarme, je avoir besoin vous arrêter un meurtrier.* The grammar was not very correct, as dictionaries do not teach syntax, but the gendarme understood it, and in another minute held the murderer in his grasp. He was afterwards convicted, and hung on the girl's testimony.

In this example we observe a kind of presence of mind not usual in the female sex. First, there was the natural impulse to express astonishment, subdued the moment it was felt, and then the rapid concentration of thought in conceiving a stratagem. In such a case as that of Caroline G——, ninety-nine women in a hundred would have betrayed themselves by an "Oh!" or a little scream.

Intimately connected with the retention or loss of presence of mind are those conditions of the nervous system which constitute bravery and cowardice. As a rule, a coward loses presence of mind, whilst a brave man retains it; yet it often occurs that apparent cowardice is the result of loss of mental equilibrium in an individual naturally courageous. At the same time, those circumstances which demand the necessity for presence of mind are not necessarily tests for either courage or the reverse.

The field of battle gives us instances of every possible effect of danger or surprise on differently constituted brains. The bravest and coolest are those who realize the danger, and yet are as calm as those fortunate individuals to whom fear is unknown. There is a well-known story of a subaltern accusing his colonel of fear on an occasion of approaching danger. "Yes," replied the colonel, as he rode steadily on; "if you were half as much afraid, you would run away." Whether such would be the result of fear on the subaltern would depend upon the formation of his brain. Innate, sordid, reasoning cowardice would no doubt cause its victim to shrink from approaching danger; but the cowardice, if it can so be called, caused by paralysis of the thinking faculties in excessive danger, generally urges the subject of it onwards. Mental depression from any cause frequently induces this mad courage, and that too in men constitutionally calm. The following story was related to the writer by an officer in the Austrian army:

"The bugle-call had sounded, and in five minutes every man was in his saddle except B——.

"'He must be dead, or so sick that he can't crawl,' observed an old major: 'I never knew B—— behind when there was fighting in front.'

"Neither had I; and I agreed with the major that it must be some physical incapability that prevented plucky B——, as he was called in his regiment, from answering to a fighting bugle-call. I volunteered to ride round to his quarters, to ascertain what had become of him, and, accompanied by a cornet and a junior captain, I proceeded thither. We found B—— sitting at his camp-table, his head resting between his hands, looking as pale as death.

"'Hollo, B——! In a panic?' exclaimed the cornet.

"'Nonsense, you young fool,' I said; 'he has pluck enough in his little finger for your whole carcass.—— What's wrong, B——?'

"'F—— is right,' he replied: 'I am in a panic. My time is come, and I shall leave my wife and little child to beggary, and worse.' (He had married in opposition to his father's wishes.)

"'Rubbish,' said D——, the captain trying to laugh him out of such an extraordinary state of mind. 'You'll bring them another clasp yet; and, by Jove! if you fall, I'll provide for them.' D—— was an Englishman, who, like myself, had entered the Austrian service; he was the son of a nobleman, and was very well off.

"'Do you mean it?' said B——, starting up, with a wild expression darting through his eyes.

"'I do, by Jove!' replied D——. 'I'll settle a captain's pay on them for

life; but I don't expect to have to do so, old fellow; you'll take care of them yourself.'

"A few words of explanation, and a repetition of his promise on the part of D——, and B—— buckled on his sword, and in another minute he was on his charger. Half an hour afterwards, we were engaged with the enemy. I kept my eye on B——. He was always brave; but now he was mad. His courage had been always characterized by extreme coolness, never courting, although never shrinking from danger, but now he rushed on his death — and he found it. Ten minutes from the time the first shot was fired, he was a corpse, transfixed by a dozen bayonet-wounds. D—— fulfilled his promise."

The impression on the brain, and its results in the action of the individual, vary considerably with the source of danger. Thus, a fear of drowning invariably destroys presence of mind; the brave man and the coward equally frantically and ineffectually struggling for life; and yet, under no circumstances, can presence of mind be of more avail than in the effort to keep the head above water, there being no art in swimming. Every scientific man ought to be able to swim the first time of entering the water, and would, if he had presence of mind. Fire also has a peculiarly paralyzing effect, but not so general as the fear of drowning.

We are told that the sensations experienced by those who have been seized by the larger Felinæ are very remarkable — a calmness almost soporific, without fear, yet the intellect remaining clear, and ready to take advantage of any chance of escape. Such has been the experience of Livingstone and many others, as we read in books of African adventure. In one instance (not published), an officer in India being seized by a wounded tiger, held his breath, to feign death. "But," he says, "I felt wide awake, though withal a calm sensation stealing over me. By-and-by, I cautiously drew my hunting-knife, and fixed its point opposite the brute's heart: I was going to set my life on a venture. I knew that he would never leave go until he killed me, and if I missed my stroke, I only hastened my fate by a few minutes. Drawing a long breath, and grasping the knife with both hands, I plunged it to the hilt in his chest. It was a terrible game; but I won. The tiger fell back dead, with scarcely a struggle: I had almost cut his heart in two."

The question naturally presents itself to us: Seeing the advantages to be gained by the retention of presence of mind, is it possible to be acquired? The answer may safely be: Certainly practice and education tend to preserve the equilibrium of the brain, which constitutes presence of mind. The sailor, the rope-walker, the sportsman, the diplomatist, are all examples of presence of mind induced by training. But, it may be justly objected, presence of mind is really only needed in sudden emergencies, which it is impossible to educate for. Yes, that is true; but calmness and deliberation once established as a habit, become constitutional, and respond under all circumstances when required. It therefore behooves us, in the most trifling as well as the most important actions, to act, think, and speak calmly, and with deliberation, to do nothing in a hurry or flurry, and, above all, to keep our tempers.

The Preservation of Milk. — To every $1\frac{1}{2}$ pints (5 oz.) of unskimmed milk, previously poured into a well-annealed glass bottle, add about 6 grains of bicarbonate of soda. Place the bottle (which must be well corked) containing the milk for about four hours in a water-bath, heated to 194° Fahrenheit. On being taken out, the bottle is varnished over with tar; and, in that state, the milk contained in it will keep sound and sweet for several weeks.

Persons who are instructed in the formation and functions of their own bodies, and are taught the efficience of therapeutics, will both bear their sickness with a less perturbed spirit, and discriminate more justly between the ignorant and skilled physician.

ON ASSIMILATION.

A REPLY TO PROF. HORSFORD.

By Carl Both.

THE chemical combinations, exchanges and reactions of the fourteen elementary minerals composing the human body in connection with warmth, light, electricity, galvanism and magnetism, constitute what we call life. To support and maintain this life we are obliged to refurnish the material for respiration, and replenish the body with these elements as soon as they become used or appropriated. The only substance which we supply as such is oxygen — all the others being supplied in previously formed combinations. Next to oxygen the principal element is carbon. The combination of oxygen with carbon *in* our body sustains life. After having combined, they both leave the body again in the form of carbonic acid, which now is not only useless, but one of the worst of poisons for the organism. Theoretically it might be supposed that carbon could be received and appropriated as such in the body, but such is not the fact; *for not an atom of carbon ever enters the body for combustion except in organic combinations.* We can, of course, introduce carbon into the blood in an inorganic form or combination, but only as a poison, or as an absolutely indifferent complication, and never as a life-sustaining material. We therefore come to the logical conclusion, that the same principle holds good in reference to all the other elements; that when any one of them is intended for organic metamorphosis in our body, it *must* be given in organic combination.

On the other hand, when one or several of these elements, as such, may be required for serving a purpose in the human enconomy, but not for decomposition, they can be taken in inorganic form; for example, water, salt, and all soluble matter given as medicines, or for other purposes, and may enter the blood, but will leave it again as such.

This is the theory on assimilation the writer has arrived at from the following facts and circumstances:—

It has been, and is still, generally believed, that iron, when given internally, becomes assimilated and causes the formation of hæmatin and red blood-globules; and for this purpose is continued in daily use, partly as a tonic, and partly as a blood-forming substance. Science, however, has given the clearest evidence that iron has nothing at all to do with the color of the blood, and that it has no relation whatever, not even the remotest, to the formation of blood-globules. Oesterlen (Heilmittel-lehre, 1861, page 134) says, "That very minute quantities of soluble iron-albuminates become absorbed, but few doubt; but this little, from iron preparations, absorbed iron seems to leave the body again immediately through the urine and other secretions; it does not become assimilated, that is, it does not enter the chemical complex of atoms of organic substances." Neither chemistry or physiology has thus far been able to say in what forms iron appears in the body. Medical experience has shown that iron has never been useful in the slightest degree in cases of blood-poverty, but, on the contrary, has, if anything, proved an injury to the patient.

The wonderful stories sometimes reported by physicians about the effects of iron, can be easily reduced to credulity and the imagination,—the sources from which the astonishing qualities of the sweet quinine (a complete hoax), etc., have found their admirers. If iron be introduced into the circulation in any pharmaceutical form, it can only act as an astringent to the blood-vessels; or when given in sufficient quantity, cause coagulation of fibrin and serious harm. In no instance has it been shown by chemistry or physiology that iron posesses the merits claimed for it; the simple fact only having been shown that iron is contained in the

blood-globules, and that it may be found almost anywhere in the body. My own view is, that the iron serves principally as a necessary body for the production of animal magnetism, and that it appears as metal, or perhaps as oxide, but probably in a form as yet entirely unknown.

In the difficulty known as Rachitis (Rickets), which usually appears in poorly-fed and ill-managed children, the lime already deposited in the bones is reabsorbed, and thrown out of the body by the kidneys; the bones themselves becoming soft and cartilaginous. It was very naturally supposed that in this disease the body was in need of lime, and consequently lime was given in every possible form and manner, but to no effect except a bad one. An examination of the urine of such children not only showed the entire amount of lime which had been given, but also an increase of the reabsorbed lime of the bones. But when lime was entirely discontinued, and fat, and good food were given, and the children brought under the influence of sunlight, the reabsorption of lime not only ceased, but the bones became hard again and the patient entirely well. From such facts it is clearly evident: 1. That the body does not and cannot appropriate lime, when taken in an inorganic form. 2. That the body, especially the bone-cells, have the power of absorbing all the lime that is necessary, and of appropriating it, when required, from our ordinary food.

In speaking of sulphur, Oesterlen says, that "as an insoluble substance it effects little or nothing, except in large doses, when it acts as a mechanical irritant." Of phosphoric acid the same author says, that "all specific curative effects of the kind described have also been found to be illusions. As in the blood, phosphoric acid can never exist free, it can scarcely solve anything,— as lime or magnesia, and therefore, when given internally, cannot increase the formation of lime phosphates, bone-substance, etc., and consequently the bone substances in disease cannot be affected by it. In fact the body has so little need of phosphates, that large quantities are constantly thrown out by the urine. Good food, pure air, etc., in all such cases, will be found far more effective than any acid." Both sulphur and phosphorus, in combination with oxygen as acids, are extremely poisonous, directly affecting and injuring the tissues. If given in diluted and very small doses, they can become absorbed, immediately combining with some alkali, to become directly excreted again by the kidneys. Neither physiology or chemistry has been able to show that any inorganic acid can be decomposed under any circumstances in the organism; — but medical experience has shown that a *continued* use of them is hurtful for the blood fabrication. Upon analysis we find, as a matter of course, phosphorus only in its combinations with oxygen as acid — but why should this be evidence that the acid, as such, must become appropriated in the economy? Because the body eliminates carbonic acid, does it prove that it appropriates it? Must it follow that because we find, *on analysis*, an element in a certain form, that it must have entered the body as such? From the fact that the animal organism tends in all its actions to higher oxydation, while the vegetable kingdom tends to reduction, we have a strong reason for maintaining that all combinations, or material *for assimilation and decomposition*, must enter the body in lower oxydations than we afterwards find them in the body. The statement that the "soda" (we presume that sodium was intended) of the common salt should contribute to the phosphate of soda in the blood, because the phosphoric acid enters as phosphate of potassa, is new to the writer. If chloride of sodium (table salt) is to furnish the soda to the phosphate of soda, water must necessarily become decomposed for this purpose. Phosphate of potassa is a neutral or slightly acid, rather inactive salt, which does not decompose chloride of sodium, so far as known to the writer; and water is not decomposed in the organism. To learn the particulars of the process referred to, would, however, be very interesting.

Water in the organism serves only as

a solvent, may *become formed*, or set free, but not decomposed, and leaves the body as water. The same is also true of common salt; it does not become decomposed, but leaves the body as such, serving in the blood and system as an irritant on the living cell, and as counterbalance to the albumen in the blood; and for this purpose, in cases of disease, stronger salts can be used to advantage with the intent to effect a quicker reaction and excretion;—for example, arsenic, mercury, iodine, etc., in their different forms.

Thus far chemistry and physiology have not shown in any instance that inorganic substances can become assimilated, that is, decomposed and appropriated for cell formation and nutrition. If, however, it can be shown by experimental facts that such assimilation actually takes place, it will prove to be one of the greatest triumphs science has ever achieved; such discovery would not only make a now costly living very cheap, but would change the whole life on the earth. Instead of raising costly vegetables and animals, we should, with the assistance of chemistry, be able to transform coal, earth, etc., into appropriate and nutritious food, and the dreams of the old alchemists would be more than realized.

That fowls must get inorganic lime for the formation of the egg-shell, and for their health, is an undoubted fact. Lime serves a similar purpose in the fowl that salt does in the human body, and the digestive apparatus of the fowl is constructed for this purpose. But if, from this, the conclusion be drawn that other animals can digest such lime as well as the fowl, it follows that a lion may live on grass, and that cows may be fed on meat; for the cow, which the lion devours, is formed entirely from grass; and we find in meat, upon analysis, all the ingredients which go to make the cow. The vegetable kingdom absorbs inorganic substances directly, and it is probable that some species of the lower animals can do the same. The very wood we burn, the apples we eat, the wine we drink, and the oxygen we breathe, are formed from the very carbonic acid we exhale, by being reduced again to carbon and oxygen in the plants. As we ascend in the animal kingdom, we find that each animal has a digestive appparatus of its own, which allows it to digest *certain kinds of food, and no other*. The digestive apparatus of the human species exhibits the greatest range of all animals, but it has its limits, nevertheless. The writer has spent a great deal of time, for the purpose of forcing the body to assimilate lime which the organism uses to *incapsulate* and bury diseased cells in the body, that is, in cases of consumption, as observed by Bennett and Virchow, previous to the observations of the writer on the same subject. (See Bennett on Tuberculosis.) To accomplish his object he cannot give lime-water to drink, but is obliged to subject the body to a long-continued process by which indirectly the lime becomes deposited in and around such diseased cells, thus rendering them harmless to the organism. Before he can think of introducing lime, he has first to call into exercise *the power* of appropriating it, by awakening the life of the slumbering and partly diseased cells around the dead ones; to reorganize the blood-circulation in the parts in question, and finally to furnish the body with the necessary lime-containing food. But if a method could be discovered by which lime could be given *directly*, and *directly* be made to calcify these cells, it would exceed any discovery as yet made on the globe; and the cure of a diseased lung could be as readily assured, and within as short a period, as the cure of a broken bone. But recent experience has again shown that the hypophosphites of lime and potash, which were extensively used all over the globe, have had no more effect on the lung than so much glass-dust or gravel; nor have their use shown any other beneficial effect. We think it safe to advance, that as impossible as it is to introduce new ideas into a brain that is not prepared to think, or constructed to digest such ideas, just as impossible is it to introduce and have assimilated any kind of matter except such as the body is especially constructed for, and adapted to appropriate.

In regard to the generally held opinion that a fish diet is best suited for intellectually engaged persons, I am sorry to state that all races on the globe who mostly or wholly live on fish, are the most stupid of all. The idea first originated when phosphorus was found to form a constituent of the brain, and that phosphorus is also a substance contained largely in fish; but there is no evidence, that for thinking, phoshorus is more necessary than sulphur, iron, or oxygen, etc. When we shall have arrived at such a point as to be able to discover a mode of diet which will make a fool wise, we may say that we have reached the summit of science. There is at present, however, no prospect for anything of the kind to happen, yet it is worth while to keep the idea in mind.

In conclusion, the writer would assert, that for the development of scientific medicine this question of assimilation is a cardinal one, and that any further development of it is most desirable. So far, while we *positively know* that the body *does* appropriate minerals from organic combinations, and that we find all *necessary* minerals in them, and while on the other hand there is only the bare possibility *that it might* make appropriations from inorganic matter, the former view is preferable to the latter in scientific medical practice and dietetics.

TEA AND COFFEE.

Brick Tea. — The utilization of the refuse of the tea manufacture is a feature in Chinese economy which well deserves attention; and the admirable product resulting from it claims the attention of philanthropists. It is well known that, from the prolonged manipulation which tea leaves undergo, a large percentage becomes much broken, or is reduced to powder, and thereby deteriorated in value. It may seem strange to many why tea dust and siftings should be considered as refuse at all, seeing they are still tea; more especially when, as a rule, they yield a stronger infusion than the finest and most perfectly curled leaves. When in the form of dust, its liability to adulteration with sand or other heavy foreign substance is vastly increased; and, as siftings, fannings, or broken leaf, an irresistible temptation is offered to the introduction of the broken leaves of other less valuable plants. Then again the darker infusion is usually obtained only at the first maceration, the boiling water so acting on the pulverized leaves that nearly their whole strength is extracted at once; whereas, with closely twisted leaves, a second, third, or sometimes even a fourth infusion fails to deprive them of all soluble material. Under such circumstances the Chinese merchant, in order to encourage business in good leaf, frequently sells his dust and siftings at a low figure, if not at a price under cost. But it happens that a vast quantity of refuse is produced in a district of the Empire so remote from the "Treaty ports," where alone business can be profitably transacted with foreigners, that some other opening had to be discovered. Such an outlet the Chinese speedily found in the manufacture of brick tea for the Russian market.

This strange phase of the fragrant herb takes three forms: Large Green, Small Green, and Black Bricks.

The large green variety is manufactured in the hilly regions in the province of Hupeh, about two hundred miles west of Hankow. It is fabricated out of the coarser leaves and upper twigs of the *Thea virides*, to which are added much of the broken leaf and dust resulting from green tea manipulation. The mass is simply moistened by the application of steam, then compressed in wooden moulds, having the chop of the manufacturer cut in relief on one of the inner surfaces. The bricks are then piled up in stacks protected from the sun and rain, but having a free current of air circulating through and around them. When quite dry, each

brick is enveloped in paper; thirty-six bricks, built into an oblong figure, are covered with dry fragrant leaves, and the whole matted over. Such packages are known as "baskets."

In color this form of tea exhibits a dusky green, and is now made to a large extent by the Russian agents of the Kiachta merchants. Large green bricks measure 13 x $6\frac{1}{2}$ x $1\frac{1}{4}$ inches, the weight of the basket being about 83 catties, or nearly 111 lbs. Avoirdupois.

The Mongol buyer proves the soundness of his purchase by placing a brick upon his head and pulling the extremities downwards with both hands; should it neither yield nor break it is considered sound; if it bends or fractures it is unhesitatingly tossed aside as worthless. Occasionally a similar test is practised over the bended knee.

Small green brick tea is always superior to large, from the simple circumstance that much greater care is bestowed on the selection of the materials, and during the manufacture; consequently, it commands a higher price, although its fabrication is similarly conducted. The usual size of the bricks is $8\frac{1}{2}$ x $5\frac{1}{4}$ x $\frac{7}{8}$ inches, and the principal emporiums for their distribution are Kiachta, Chita, and Nerchinsk.

Neither of these two forms of brick tea undergo fermentation. Black brick tea, named in Mongolia "Dirintirroo," is made into cubes of the same size as small green. It consists of siftings, fannings, and the dust resulting from the preparation of Moning and Kaisow teas for the London market, with an admixture of Bohea and small twigs. Like small green, it is usually packed with 64 or 72 bricks in a basket, and is in request among the Tartars or Khirgis of Western Siberia.

The commerce until within the last nine years, was wholly in the hands of the Chinese; but, forecasting events, and depending on the superiority of European to Asiatic manipulation, the Russian merchants of Kiachta boldly sent their own agents to Hupeh, who have not only succeeded in producing a better quality of tea, but have since then monopolized a considerable percentage of the brick tea trade.

The Chinese transport the greater portion of their brick tea overland, *via* Shansi, whilst the Russians invariably send theirs *via* Shanghai and Tientsin to Kiachta, whence it is transported to Siberia, Tartary, and Russia, on the backs of camels.

EXHAUSTED TEA-LEAVES.—At one period, many of the luxuries of life, on account of their expense, were vended by only a few dealers, and confined to the tables of the rich. Under such circumstances, the temptation to tamper with their purity was limited; and when adulteration occurred, the superior intelligence and information possessed by those who could afford to use such luxuries, usually brought about speedy detection. This state of things is, unfortunately, in one sense, entirely altered now. The pure luxuries of a past generation have become the adulterated necessaries of the present; the rich man may occasionally enjoy his butter, his coffee, and his congou, devoid of horrid suspicions of tallow, chicory, and exhausted leaves; but, notwithstanding the revelations of chemistry, the poor man cannot,—up to the present he does not.

Public attention has recently been called to the subject of the sale of spurious tea. This tea, which is described as "Fine Moning Congou," is really nothing but the re-dried leaves of the exhausted tea, the peculiar piquancy of which is increased by the fact that, in Shanghai, the pigs and dogs freely promenade amongst the rotting heaps in the streets. "The leaves are for the most part quite rotten from the putrefactive decomposition, and do not contain more than a trace of the active principle of tea. The odor of them is very offensive; and, when infused in boiling water, they produce a nauseous and unwholesome liquid." With such a repulsive description before us of an article which yields, or ought to yield, the most fragrant of all infused beverages, it may be instructive to glance at the composition of good, sound tea, with a view to ascertain what ingredients are eliminated by infusion; in other words, how leaves become exhausted.

The following are the analytical results of some of the best specimens of tea obtainable, at the periods when the chemical examinations took place, and are compiled from the researches of Johnston, 1853; Mulder, 1861; and others, in 1869:

Composition of Pure Dry Tea.

	Chinese.		Assam.
	Green.	*Black.*	*Black.*
	—	—	Approx.
	Per cent.	Per cent.	Per cent.
Volatile Oil,	0.79	0.60	0.57
Chlorophyll,	2.22	1.84	1.79
Wax,	0.28	—	0.39
Resin,	2.22	3.64	2.70
Gum,	8.56	7.28	8.03
Tannin,	17.80	12.88	20.11
Theine,	0.43	0.46	3.87
Extract. Matter,	18.46	19.88	19.70
" Deposit,	—	1.48	1.90
Extracted by Hydrochloric Acid,	23.60	19.12	16.70
Albumen,	3.00	2.80	2.22
Woody Fibre,	17.08	24.78	17.17
Ash,	5.56	5.24	5.35
	100.00	100.00	100.00

The following are the proportions of theine, the most important constituent of tea, as found in various samples at different times, by Stenhouse:

In Hyson . . .	1.05 per cent.
In Twankay . .	0.98 "
In Fine Congou . .	2.13 "
In Average . .	2.00 "
In common Congou .	1.02 "
In Bohea . . .	0.70 "
In Assam . . .	1.37 "
In Kumaon . .	1.09 "

The nitrogenous constituent of tea, according to Péligot, has been ascertained to be:

In Pekoe . . .	6.58 per cent.
In Souchong . .	6.15 "
In Gunpowder . .	6.15 "
In Assam . . .	6.10 "

The exhausted leaves contain much vegetable matter insoluble in boiling water, but which is readily given up in the presence of an alkali. Taking advantage of this circumstance, the tribes of Central and Northern Asia, who care little for flavor, mingle their tea, which has previously been boiled in alkaline steppe water, with fat, and flour, consuming the whole as a broth. It needs but a glance to see that, apart from any putrefactive decomposition which may be discovered in re-dried tea-leaves, they are not unfit for human food, if consumed as a vegetable.

The use of leaves which had "passed through the pot," as a means of increasing the bulk of tea retailed by certain grocers of "easy virtue," was brought before the public some years ago. It was supposed, in 1843, that there were eight manufactories for the purpose of re-drying exhausted tea-leaves in London alone, besides many others in various parts of England and America. The practice pursued was as follows: — Persons were employed to buy up the exhausted leaves at hotels, coffee-houses, and other places. These were taken to the factories, mixed with a solution of gum, and re-dried. After this, the dried leaves, if for black tea, were mixed with rose pink and black lead, to "face" them, as it is termed by the trade.

Coming to a more recent period, we find a quantity of material expressly prepared for tea adulteration, which possessed the negative merit of containing no tea at all. It consisted of broken sycamore and horse-chestnut leaves, stuck together and rendered astringent with catechu.

It must be evident from the foregoing, that the time has passed away when we need hold up our hands and roll our eyes in holy horror at the iniquity of the Chinese. Surely it were better to mingle our frugal Congou with Maloo mixture, over which the nimble Shanghai pigs had gyrated, and China dogs gambolled, rather than return to the days of slow poisoning by arsenite of copper, chromate of lead, catechu, etc.

Coffee. — Having seen in our last number the properties of Coffee, we will now glance at the adulterations already discovered. The following is a list of the adulterations detected: —

1. Chicory.
2. Roasted wheat.
3. " peas.
4. " beans.

5. Roasted carrots.
6. " mangoldwurzel.
7. " rye.
8. " acorns.
9. Sawdust.
10. "Coffina" (lupin seeds).
11. Oak bark.
12. Groats.
13. Baked horse's liver.
14. "Black jack."
15. Reddle.
16. Venetian red.

These are, therefore, the matters which are employed for the sophistication of coffee:

Of forty-six samples of coffee purchased at different points, an examination showed that 17 were pure, 5 contained chicory, 18 chicory and roasted grain, 1 chicory and sand, 1 chicory, roasted grain and sand, 1 chicory and foreign roots, 1 husks or "parchment," 1 roasted grain, and 1 stinking berries.

Thus it will be seen, that twenty-nine of the forty-six samples examined were adulterated; and that chicory entered as an adulterant into twenty-six of them. The adulteration noted as roasted grain is principally made by means of raspings of loaves, stale sea-biscuit, and other refuse farinaceous matters. This sophistication seems to be the most in vogue at present, and it is certainly the best to defeat popular detection by the sense of smell.

Chicory, the chief adulterant of coffee, is the dried and roasted root of a plant which belongs to the botanical order of *Compositæ*. It is very similar to the common dandelion, which belongs to the same order, but it is readily distinguished by the color of its flower, which is blue, while that of the dandelion is yellow. The chicory root also bears great resemblance to that of the latter plant, being, like it, soft, and exuding when squeezed the milky juice so well known to all of us who have enjoyed, as children, the pleasure of wandering in the fields.

The following analysis will show the composition of chicory root in its dried state, and also that of its ash, to which we shall have occasion to refer hereafter:

I. — *Dried Chicory.*

Moisture	17.480
Gum	20.416
Sugar	11.166
Extractive (bitter)	18.000
Fat	1.066
Woody fibre, etc.	29.202
Mineral matter	2.670
	100.000

II. — *Composition of the Ash.*

Potash	0.672
Soda	0.408
Lime	0.250
Magnesia	0.184
Iron	0.085
Sulphuric Acid	0.284
Chlorine	0.127
Carbonic Acid	0.078
Phosphoric Acid	0.303
Sand	0.279
	2.670

From these results it is evident that this plant contains no principles which would render it to any extent a useful substitute for coffee, as we look in vain for the *caffeic acid*, or the *theine*, already shown to exist in coffee. But what shall we say if, besides containing nothing valuable, it should be proved to be positively injurious when freely consumed? Let us hear Dr. Johnston on this subject: "Taken in moderate quantities, the ingredients of chicory are probably not injurious to health, but, by prolonged and frequent use, they produce heartburn, cramp in the stomach, loss of appetite, acidity in the mouth, constipation with intermittent diarrhœa, weakness of the limbs, trembling, sleeplessness, a drunken cloudiness of the senses, etc. At the best, therefore, chicory is a substitute for coffee, to which only those to whom the price is an object ought to have recourse." To these remarks we would add, that we prefer not being poisoned even at the most moderate cost; and in cases "where price is an object," we would advise the public to abstain from paying anything at all for such a filthy beverage, as chicory-coffee undoubtedly is, to persons of unvitiated taste. We might bring up many other charges against this nasty infusion, but we will only give one more, and that is

a dictum of Dr. Boer's, to the effect that the continual use of chicory causes *amaurosis*, and consequently blindness.

We now turn to the detection of the adulterations of coffee. Many simple processes have been from time to time proposed, to ascertain whether this article be pure or not, without saying exactly what is the adulterant; and of these we subjoin a few:

1. Take the packet of coffee as it comes from the grocer's, in your hand; and, having given it a good squeeze, lay it gently on the table and open it. If the contents be found adhering together in a cake, the sample is not pure.

2. Drop gently a teaspoonful of coffee on the surface of a glass of water, and observe if any of it sinks immediately; if so, it is bad. Let the whole be now slightly stirred, and notice the color imparted to the water; if this be a decided brown tint, then the coffee is adulterated, most probably with chicory or burnt grain of some kind.

3. Make an infusion of the coffee in the usual way, pour some into a cup, and let it stand till cold; if a skin or scum should form on the surface, there is reason to suspect baked animal matter, such as horses' liver. Microscopic examination however will prove more effectual and satisfactory in its results, than any other process.

Microscopic Appearances of Pure Coffee. — We notice that there are two totally distinct forms visible. (1.) Several little flat fragments marked all over with irregular angular cells. These are fragments of the body, or substance of the seed; and the cells are those which contained the essential oil, already referred to last month. (2.) A number of peculiar oval, or rather lance-shaped bodies, resting on a fibrous membrane, and having tooth-like oblique markings between their edges. These are fragments of the outer skin or *testa* of the seed, and are wonderfully characteristic of pure coffee. None of those structures appear in any of the usual adulterations of this substance.

Microscopic Characters of Pure Chicory. — Here are no lance-shaped bodies, nor angular cells. We now notice a mass of round and elongated cells, evidently of a soft tissue, which form the principle portions of the substance of the chicory root. We also observe a number of long tubes laid in bundles over the cells, having a most characteristically and beautifully marked surface. These tubes come from the centre of the root, and, once seen, can never be mistaken, except for the similar tubes of dandelion, which we will next describe.

Microscopic Characters of Dandelion. — These are so similar to chicory as to be readily mistakable for that root. On examining them more minutely, however, a difference is observable. The cells are more elongated, and the tubes are more decidedly marked in complete rings, while here and there we find masses of a structure closely resembling the ribs of an animal.

For the detection of roasted grain, we depend mainly on the appearance of granules of starch, which can be identified by their size and shape. The cells of turnip are much larger than those of chicory, while particles of sawdust, especially mahogany, can be picked out from coffee, by means of a needle, and readily identified. Mineral coloring matters may be discovered by burning some coffee in a small porcelain crucible, when, if the ash be red, it is certain that venetian red, or other ferruginous earth, has been added to deepen the color.

As in this world partisans can be found for almost any dogma, no matter how ridiculous it may be, provided that it is only asserted loudly and unblushingly enough, — so our grocer friends have, by dint of continual asseveration, got a large number of people to positively believe in chicory-coffee, and call this filthy root an improvement! The terrible absurdity of this idea must be manifest to any one who glances for a moment at the subject. Chicory is a root, while coffee is a seed. The former, buried in the ground, deprived of the influence of sunlight or air, only contains a few of the crudest vegetable

matters, so to speak; while the latter, flourishing under a tropical sun, has all those complicated and refined organic principles, such as alkaloids, for the formation of which the action of light, etc., appears to be absolutely necessary. The advocates of chicory adulteration know well that it produces a sensation of oppression in the stomach, and they take advantage of this to pretend that chicory-coffee has strength, and are believed by ignorant persons who cannot discriminate between that quality and indigestion, and whose palates have long since been thoroughly vitiated. Another cry of these apologists for adulteration is, that, thanks to chicory, coffee is brought down within the means of the poor, who otherwise could not afford to drink it. The simple fact is that, as a rule, the poor get little or no coffee in their cheap mixture, while the grocers get a sum per lb. for a substance which would not fetch one-half the price, if it were sold in its own name.

In conclusion, it is to be hoped that complete success may attend the introduction of tea and coffee culture into our own country, in California. A single individual has, it is said, established a Japanese colony for the culture of the tea-plant at Placerville, El Dorado County, where over one hundred acres have already been laid out with 200,000 tea-plants, which give promise of a bounteous crop of savory teas.

Another gentleman, deeply impressed with the idea that good coffee could be grown in California, procured at no little trouble a quantity of the seed coffee of very fine quality, and will, it is said, without doubt succeed in bringing the plants to perfection. The time, therefore, we trust is not far distant when the home production of tea and coffee will be of sufficient magnitude to bring the cost of a pure article of good quality within the reach of the poor, and thus at the same time remove the strong temptations to adulteration which at present exist.

VEGETABLES BETTER THAN NOTHING.

WITHOUT advocating the views of absolute vegetarians, it is certain that much more sustenance might be derived from vegetables than is now obtained, by those who cannot afford a proper quantity of meat. The cause is simply ignorance, prejudice, lack of imagination and ingenuity among the poorer housewives; while the more wealthy and educated have not the stimulant of need to enforce their investigation of the matter. Abroad, a thousand and one contrivances have replaced in poor families the use of meat; the poor, of our cities especially, too often console themselves for the absence of animal food by drinking, for the most part, poisonous spirits. To remedy these evils, good teachers and willing pupils are wanted; but the poor decidedly object to learn, and no one has had the courage to attempt to teach them. Burke's immortal maxim has done in this wise some harm. Let us imagine a bold philanthropist, who would enter an American's home and teach his wife how to select and cook vegetables, after scientific rules, for the general advantage and economy of the family. What a desecration of the freeman's dignity—what unwarrantable interference in domestic affairs; in a word, a man's house would be no longer his castle. If, however, it is impossible to give lessons personally, the press might have achieved the work, or at least assisted in it. But this is not so, and it is to the discredit of that great power; nay, more, it proves that the press is not altogether free from the empire of selfishness. The poorest have been made to sympathize with the political interests of their newspapers, to the advantage of party or individuals; but nothing has been done to teach them how to mind their own particular domestic affairs. Far be it from me to deny the political advantages enjoyed by the poorest classes — advantages which have been fought for and won by the cheap press. But is it not of equal importance to keep the poor from par-

tial starvation, and the "drink of despair," by teaching them how they can derive, I may boldly say, double the advantage from their expenditure? This has hardly ever been attempted, and for this purpose it would be well to investigate how far vegetable matter can be used as a cheap substitute for meat, thus proving itself better than nothing.

Undoubtedly great sustenance can be derived from vegetables. Vegetarians can give us many examples to prove that vegetable matter alone will sustain life, but I limit myself to one or two instances, proving that we are not absolutely dependent on meat, and that in its absence, or with a very small quantity of it, good health and strength can be secured. Volney, a well known, though not a recent authority, describes the Wallachians in his travels as "tall, well-built, robust, and of a very wholesome complexion, diseases being rare among them." Further on we are told, "the manners of the Wallachians, as far as I have been able to judge them, are simple, and neither embellished nor sullied by art. Temperate in their repasts, they prefer vegetables to fruit, and fruits to the most delicate meat." The miners in Belgium furnish another good example. They eat, according to a report made in the locality, 2 lbs. of bread per day, about 2 oz. of butter, 1 oz. of coffee and chicory mixed, while for dinner they have in the evening a portion of vegetables mixed with potatoes, weighing at the most 1½ lbs. They have meat on Sundays and festivals, but during the week they drink neither beer nor other fermented liquors. Coffee is their only beverage. Yet these workmen are hardy and healthy. It is not the coffee which sustains them, for it constitutes but 1-35th of the nutritious properties of their aliment, though M. de Gasparin, in a paper read some years ago before the French Academy of Sciences, attempted to prove, from certain tables, that the waste in liquid excretion is less where coffee is drunk than at other times. The miners' coffee is not like the French *café au lait*, for it has but 1-10th part of milk in it; he drinks several pints in the day, and eats only bread and butter until the vegetable meal of the evening. The albuminous substance which enters into the rations of the Belgian miner is thus reduced from 23 grammes to 15 grammes of azote. This is less nutritious even than the diet of the monks of La Trappe at Aiguebelle. Here is, therefore, proof that life and health can exist throughout a whole population with less nutritive substance than is generally considered necessary; that meat can be replaced by vegetable and farinaceous matter.

Occasionally a good wholesome vegetable diet would be better than nothing; and, by refreshing the blood and assuaging thirst, would lessen the temptation of drink, always so great in moments of feverish anxiety, poverty and want. Without adopting the miner's diet, many a good meal can be made for a few cents from vegetables, cooked with more art than at present shown. It would take too long to analyze all the different vegetables at hand; and I will content myself with a few practical examples illustrative of my meaning.

For a cheap, yet tasty and substantial dish, let me suggest that the housewife grate two carrots, two turnips, one parsnip, a little beet-root and artichoke into one pint of split peas, boiled in two quarts of soft water for two hours. The whole might then be boiled with three teaspoonfuls of Indian, wheaten, or Scotch meal, mixed in cold water, leaving it to simmer together for two hours more; a little parsley, mint, and thyme will flavor the dish. More water might be added if necessary. This somewhat complicated "hodge-podge" would well satisfy a family, and cost less, at any rate, than butchers' meat. It would not do every day, but might occasionally save the meat and avoid the horror of stinting at dinner. For a cheaper dish, why should not the lentil be introduced for every-day use, as in France? For instance, let a pint of lentils be soaked in pure soft water for twenty-four hours, then put in a stewpan (earthen or enamelled is best), and boiled for four hours. Then two onions, one parsnip, one carrot, a little parsley,

thyme cut small, and a small quantity of boiled rice should be added. This, mixed and boiled a short time together, would produce a satisfying and savory dish, somewhat better than the diet of the Belgian miner, and yet very cheap. Lentils are about the most nutritious vegetable we possess. In 100 lbs. they contain 84 lbs. of solid matter, and 16 lbs. of water of which 33 lbs. are of flesh-forming, and 48 of heat-forming principle; while butchers' meat, according to Baron Liebig's table, has but 21.5 lbs. per cent. of flesh-forming principle, and 14.3 that gives heat. The rice has 82 per cent. of the heat-forming principle. Compared with these, the other vegetables are more useful as giving water, flavor, and rendering the dish light and digestible. The celebrated Indian and Chinese dish called *dahl*, has also lentils for its chief ingredient, and is purely of vegetable matter. It is substantial and delicious, and is made as follows:—Stew a quart of split lentils till they form a thick soup; have ready a pound of rice, well boiled in milk, and drained off as dry as possible. Shake the rice up loosely in a dish, and, after mixing an ounce of curry powder with the lentils, pour the lentil soup over the rice and serve it up. Dishes, cheaper even than these, may be made palatable.

SNAKE-BITES AND THEIR ANTIDOTES.

AMONG the remedies applied by natives of India for the cure of snake-bites, I do not think there any which demand notice. In the native pharmacopœia there is no single remedy which is efficacious. Under such conditions, it is not at all surprising that they have not attained to any excellence, especially when it is considered that even we, with our high civilization, knowledge of chemistry, and powers of analysis, are compelled to acknowledge that we are able to do but little against the irresistible virus of the cobra. Still our remedies are unaccompanied by any hocus-pocus, and stand or fall — and are meant to stand or fall — by their intrinsic merits.

Two cases of cure of alleged snake-bites, effected upon natives, have come under my personal observation, in one instance by "eau-de-luce," brandy and violent friction, in the other by the same means, with the exception of the eau-de-luce, which was not procurable at the moment. I have said "alleged snake-bites" advisedly, because I cannot speak with any certainty on the point, nor as to the species of the snake in each case. Marks similar to those usually inflicted by a snake were indicated by the bystanders, the symptoms were identical with those which usually accompany the operation of snake venom, and the statements of the patients on recovery were that they had been bitten by snakes. I have, therefore, every reason to believe that they were what they were assumed to be. I have, however, no evidence of the type of snake. One patient frankly acknowledged that he had no idea of what kind of snake had bitten him. He was simply aware that he had been bitten by a snake, and from that moment had been in a state of terror. The other patient indicated a kerite as the offender. I should, however, be loath to place too implicit a reliance on his statement. In the first case (said to be a case of kerite bite), when assistance was afforded, the patient, who had apparently been bitten just above the ankle, was nearly senseless. Eau-de-luce was at once applied externally to the wound, and well rubbed in; and twenty-five drops of eau-de-luce were poured down his mouth, which was firmly clenched, and was with difficulty forced open by an iron instrument. He was then raised, his limbs well rubbed, and he was forced to walk. In five minutes another dose, diluted in water, was given. Brandy was poured down his throat at intervals, and circulation induced by vigorous friction. The sufferer gradually revived; and in the morning, twelve hours after the accident, was quite well.

In the second instance, the patient was quite sensible, but languid. He said he had been bitten at 3 P. M. It was then 8.30 P. M. He was gradually becoming more inactive, but on being roused forcibly, and plied at intervals with strong doses of brandy, he became more lively, and eventually recovered. In this instance, also, when the sufferer was at the worst, a great difficulty was experienced in opening the jaw to administer the liquor.

Among other successful cases, two have come to my knowledge which are somewhat striking. One occurred to a gentleman in the English Civil Service, in India, who was bitten by a cobra on the tip of the finger. With considerable presence of mind, he took off his coat, and at once made a strict ligature on the arm, just under the shoulder, justly reflecting that the poison might have found its way past the fingers and wrist. He then made deep cross incisions on the wound, and, keeping the hand pointed downwards, expressed as much blood as possible. The poison appears to have been eradicated, for he experienced no unfavorable symptoms subsequently. It is not always that such happy results follow, even when a ligature is instantly and skilfully applied, as will be seen in a subsequent portion of this article. Indeed, the poison is so subtle, and the difficulty of compressing the arteries sufficiently so difficult, that this antidote, which, when practicable, seems to be the only hopeful one, is rarely successful.

The second case was brought to public notice in a Calcutta journal by one Kadernath Mitter. It appears that a native woman by name Khired, was bitten by a snake, *alleged* to have been a cobra. The lady was very far gone when Mr. Mitter appeared on the scene. He had apparently heard that a woman lay at death's door in his neighborhood, a victim to snake poison. This philanthropic gentleman at once perceived that his services might be valuable,—he therefore felt himself bound to assist. He had heard that ammonia was sometimes used as a remedy. He had probably very little idea what ammonia was, but, like a drowning man, sooner than catch at nothing at all, he caught at the straw presented by his knowledge of the existence of ammonia, and he trusted to his own acumen to guide him in its administration. From a neighboring chemist he at once procured two ounces of the drug, and subsequently six ounces more. Thus armed he proceeded to the cure, administering every five minutes drachm doses, until at last the poor woman articulated, with emotion, that she felt a burning sensation in her chest, and was "like to die" of thirst. A little cold water was allowed, and then the drachm doses were brought into full swing again, but luckily at longer intervals. Eventually a cure was effected.

This rough and ready treatment seems to have alarmed the medical profession; for within a day or two afterwards two letters appeared in the same journal, one signed by a surgeon-major, animadverting upon the extraordinary nature of the treatment, and cautioning the public against putting it into operation too readily; for, as he observed, ammonia in such liberal doses was equally as likely to destroy an ordinary patient as any snake-bite; and he attributed the recovery in that case to the extraordinary strong constitution of the sufferer, who succeeded in struggling back into life in spite of the combined effects of the venom and its supposed antidote.

Lately, in Calcutta and its neighborhood, a series of experiments have been attempted, by both professional and unprofessional men, with a view to testing accurately the best known remedies against the virus of snake-poison. With what result, it is proposed to show by a brief review of the experiments which have come under personal observation, or have been brought to notice through the medium of the local press. It will be as well first to enumerate the different processes which have come under trial during the course of experiment, as also such as have been suggested by amateurs whose interest has been aroused during the investigation.

1st. Both amateurs and professional men seem to have relied in a great measure on ammonia, or some preparation containing it in large proportions. This has been applied, both externally by friction on the wound, and internally by frequent doses in solution, and also by injection into a vein or artery with a hypodermic syringe. A solution of quinine, and also that known as "Condy's solution," were likewise injected in the same manner.

2d. Carbolic acid rubbed into a fresh wound, previously scarified, both alone and aided by doses of ammonia, has received considerable support from some.

3d. The actual cautery, generally in combination with any or all other modes of treatment.

4th. In cases where the extremities of the limb were the parts bitten, the use of a strict ligature has preceded other remedies used in conjunction with it.

6th. The following antidote also found its way into a public journal, but there is no evidence of its ever having been resorted to by any of the experimenters, nor does the communicator attempt to establish its efficacy by any mention of recorded instances of cure:

"The remedy referred to is the juice of the cotton plant — the shrub variety — and the method of treatment as follows: A wine-glass of the juice is to be administered immediately, or as soon as possible after the bite. The bitten part to be excised, and some of the juice rubbed in. Injection is to be preferred. Also to be rubbed into such parts where absorption is speedily promoted. This mode of treatment to be repeated every quarter or half an hour, according to the case, and to be discontinued either after the third or fourth repetition, or some time after the patient has shown signs of amendment."

7th. Dr. Halford's (Professor of Anatomy, etc., Melbourne, Australia) system has been prominently brought before the public, and has to a certain extent been recognized and sanctioned for general adoption in the Bombay Presidency of India, by order of the Inspector-General of Hospitals (Indian Forces) of that Presidency. Briefly stated, it is the system which professes to cure by the injection of ammonia into the blood. It has been tried, with other antidotes, by Dr. Fayrer, of Calcutta, in a course of experiments, with what result will be demonstrated further on.

The following account of the successful cure, by means of ammonia and carbolic acid, of a dog bitten by a cobra, appeared in the *Englishman* of the 25th July, 1869: — "A fine fresh cobra was brought in this morning; the dogs were secured, and each was bitten. One was left to its fate. The other was experimented upon by the acids. The result of each case I note underneath." Condensed, the main features of the case appear to have been as follows: — The first dog bitten was full-grown, and received two bites at 11.25 A.M. At 12 noon he lay down, breathing heavily. The torpor increased rapidly, and at 12.32 — that is, in one hour and twenty-four minutes — he was dead. The second dog also was a full-grown one, and was bitten by the same snake at 12.54 P.M. Carbolic acid was applied at the excised wound three minutes afterwards. In half an hour the dog appeared lethargic. Ammonia (eau-de-luce) in solution, in a twelve-minim dose, was given internally. He rallied at once, and in the evening was none the worse. It will be noted that the dog operated upon received the *third* bite of the cobra. There is, therefore, room for presumption that the virus of the snake had been in a great measure exhausted in the two previous attacks. This view is supported by subsequent experiments made by the same gentleman in my presence. On the 31st July we proceeded, with three other gentlemen, to the Government Saib, where a cobra was waiting for us. The snake was not full-grown, but sufficiently so to conceal the most virulent poison. On this occasion, at our suggestion, the dog upon which it was proposed to operate was bitten first — three times

on the leg. Carbolic acid was applied after the lapse of three minutes to the scarified wound. In an hour and five minutes the dog lay down, breathing heavily, and rapidly became worse. Ammonia was administered on the appearance of worse symptoms, but with no favorable result. The dog died in one hour and nineteen minutes.

Within five minutes of the time the first dog was bitten, a second, a puppy, was struck twice severely on the nose by the same snake. (It must be remembered these were the fourth and fifth bites.) Blood flowed from the wounds. He was then carefully watched. No ill effects followed. A third dog, also a puppy, was bitten by a cobra fourteen inches long, with a view to ascertaining whether any virus could be concealed by so young a specimen. No remedies were applied, and the dog was none the worse. The youngster bit most viciously, and evidently had the will to injure; but it is apparent that in their earliest days no poisonous secretion is deposited in the fang — perhaps the fang itself is of later growth. The same dog was now applied to the larger cobra; but without ill effects.

On the 3d of August, at the same place, the same cobra, which had been in confinement some time, was forced to bite a full-grown pariah (dog). Carbolic acid was applied as usual. No symptoms of suffering were observed. Eau-de-luce in solution was administered as a precautionary measure half an hour after the bite. A second dog was also bitten repeatedly by the same cobra, but he also was none the worse. The just conclusion to which this series of experiments lead us, is that, in the first place, bites subsequent to the first and second are less fatal as they are repeated; and, secondly, that confinement tends to prohibit the secretion of the natural poison of the species. There is also room to believe, from the protracted duration of the fatal cases, that the snake in question was not one of a very venomous family of cobras.

SWIMMING.

THE pleasures of swimming need not be dwelt on. To feel one's self completely at home in a new element, to lose the sense of ponderosity, to be able to move one's limbs in any direction through an unresisting medium, is to enjoy, for the moment, the pleasures of existence of a different order of animals. To feel not the weight of the flesh which we often find "too, too solid," on terra firma; to dart hither and thither at will, roll over on side or back, or dive into the depths beneath us, is little short of ecstasy; we are no longer a terrestrial animal, we have entered a new phase of existence, we are a fish, our limbs are fins, and the water is our element. He who passes through life without learning to swim misses one of the purest pleasures life affords, and deserves to be drowned in a six-foot pond.

Swimming is an exercise at once healthful, pleasant, and useful. The full hygienic effects of swimming can only be obtained when it is practised in the open air, and in unpolluted water of a natural temperature. In a close, more or less imperfectly ventilated room, and in water artificially heated, from which, consequently, the air has been partially expelled, swimming, while still retaining its characters of pleasantness and utility, ceases to be a hygienic agent of any considerable power. Every town which aspires to be considered at all perfect in its sanitary arrangements should possess ample swimming-baths of pure water in the open air. The sea-side towns are provided by nature with a most exquisite description of swimming-bath in the ever-changing, ever-fresh sea — ever-fresh, that is, when not polluted by the drainage of the town, as often happens. But our inland towns are not so well off, and unless in the neighborhood of a lake or a river, they must construct artificial baths or do without them. Even when they have a lake or a river

they too often allow it to be so polluted by sewage as to render it unfit for bathing purposes; and when they have neither lake nor river, they too often neglect to provide artificial substitutes, thus depriving themselves of a powerful hygienic agent, a pleasant recreation, and a useful accomplishment.

The healthful effects of swimming in cold water in the open air result from the peculiar exercise, the temperature of the surrounding mediums, and the exhilaration of the spirits it causes. Before entering the water, and each time of leaving it, we enjoy an air-bath, the beneficial effects of which are not solely or chiefly dependant on the temperature, but are mainly owing to the actual impact of the atmospherical gases, and of the light, and possibly the direct rays of the sun upon the skin. In the water, if it be considerbly colder than the ordinary summer air, say 50° to 60°, there is a rapid abstraction of heat from the surface, causing contraction of the cutaneous blood-vessels, and expulsion of their blood, which sometimes produces an almost painful sensation. If we then get out of the water at once, there is a rapid reaction and an intense glow, often so intense as to cause tingling over the whole surface, accompanied with visible redness, owing to the sudden reflux of the blood into the cutaneous vessels. If, however, we remain in the water in spite of the painful sensation caused by the first action of the cold, this gradually subsides, and if the water be not very cold, and our reactive powers good, and we keep ourselves always moving, the blood gradually returns towards the cutaneous surface, and we thus become accustomed to the low temperature, and can remain a considerable time in the water that seemed at first too chilly to be borne. When we then come out of the water we do not perceive any sudden reaction, but unless we have remained too long in the water, we only feel refreshed and invigorated.

The exercise in swimming is quite peculiar. The body and limbs being completely supported by the medium in which they are immersed, the muscles are not employed in supporting their weight, consequently their movements have a freedom not enjoyed in any other exercise, and are attended with little or no fatigue. This is, however, only the case with experienced and confident swimmers, swimming deliberately and at their ease. The inexperienced swimmer finds the exercise very fatiguing. This, I believe, is chiefly owing to his unconscious efforts to keep more of his body out of the water than would be effected by its own natural buoyancy. The experienced swimmer lets the water do all the supporting business, and consequently swims deeper than the tyro. Very rapid swimming, of course, will soon exhaust even the most experienced swimmer, just as any other violent exercise will exhaust. The quickest swimmers show very little above the water when swimming a race. It so happens that swimming competitions are confined almost entirely to rapidity of swimming, and everything is sacrificed by competitors to quickness. The kind of swimming cultivated by swimming athletes, whether amateur or professional, is neither graceful nor salubrious, and its utility, except for gaining cups and medals, is very doubtfnl. The secret of the hygienic effects of swimming in sea, lake, or river, is gentle exercise in a medium whose temperature excites the system to vigorous reaction. I do not attach much importance to swimming in cold water as a means of cleansing the body. There is no doubt that it does wash off the grosser impurities that accumulate about the skin, but it cannot be considered as a substitute for the daily tub with plenty of soap, by means of which only can the skin be kept perfectly clean and wholesome.

The uses of swimming are obvious. To be drowned by the upsetting of a pleasure-boat within a few yards of the shore — can anything be more pitiful? To see our friend, perhaps our child, perish because we cannot swim a few yards to save him — can anythying be more painful? Think of the number of lives that have been lost by inability to swim, of the number of lives that have been saved by the possession of

this faculty. He who cannot swim is as far from being perfectly educated as he who cannot walk.

But, it will be alleged, there are dangers connected with swimming. And so there are dangers connected with walking, riding, driving, railways, steamboats; but these dangers do not deter us from making use of these means of locomotion. But let us see what these dangers are. In learning to swim you may get out of your depth and be drowned: Then learn to swim in shallow water. The cold water may give you a chill: Not much fear of that unless you are very imprudent, but to avoid that insignificant risk you can learn to swim in tepid water. There are such baths in most large towns. There is the risk of cramp overtaking the most practised swimmer, and sinking him suddenly to the bottom: Swimmers do sometimes sink suddenly in deep water and so get drowned; but I doubt if they are often good swimmers, and I doubt if it is cramp that sends them to the bottom. The *Lancet* lately alluded to this subject, and suggested that it might be a sort of spasm of the respiratory muscles, whereby the air was suddenly expelled from the lungs, and the specific levity of the body being thus lost, the swimmer sank like a stone. That may be partly true, but I am convinced it is not the whole truth, nor does it explain how the catastrophe is caused. I believe the so-called cramp to be a spasm of the heart and respiratory organs, and that it is produced in this way: the swimmer may be accustomed to swimming, but he has never thoroughly mastered the indispensable first step in swimming, of committing the support of his body entirely to the water. He exhausts himself in efforts to elevate his head and shoulders above the water. As he gets into deep water these efforts, which are of the nature of nervousness, are increased; the cold of the water (to which perhaps he is unused from having hitherto practised swimming chiefly in tepid water) sends the blood in upon the heart, he feels choking, throws up his arms with a loud cry, and goes to the bottom at once. The cause of this often fatal seizure I believe to be a compound of nervous exhaustion, anxiety, and cold. It is extraordinary the difference that prevails in regard to the power of resisting cold. I have seen a man shivering and blue after five minutes in one of the tepid swimming-baths, while others can remain an hour or longer in the sea, and come out warm and comfortable. The power of resisting the cold of the water often depends very much on the condition of our body at the time of immersion. If we enter the water feeling cold we soon become thoroughly chilled, but if we are warm from the heat of the weather, or, still better, from previous moderate exercise, we can much better resist the cold of the sea, lake, or river. A dip in cold water, even a cold sponging bath, will cause some men's extremities to die away and remain apparently devoid of circulation for hours. We can then easily imagine that the cold of the sea, or of a lake or river, may in an individual so sensitive to its effects cause such an accumulation of the blood about the heart and lungs as to produce all the phenomena observed in drowning by so-called cramp. That a certain degree of fear or anxiety is one of the causal elements is, I think, sufficiently proved, by the fact that this so-called cramp never occurs in shallow water. That it is not cramp of the voluntary muscles is, I think, evident from the fact that many people do get cramp in their legs when swimming, and this, though painful, is not dangerous, for we can always throw ourselves on our back or swim in spite of the pain. I have actually plunged into deep water with a slight attack of cramp in one of my legs, but found no difficulty in keeping myself afloat until the cramp subsided. Although, until its nature is precisely understood, there will always remain some risk of accident from so-called cramp, still I believe the risk would be reduced to insignificance if those who chill rapidly, whom swimming fatigues, or who become nervous in deep water, would refrain from venturing beyond their depth until they have conquered these failings, which habit will soon enable them to do.

But the slight risks attending swimming in cold water should not deter a community from providing itself with open-air swimming places. The risk from drowning will be entirely obviated by artificial constructions on a lake or river, such as are to be found in many continental towns.

The shallowness of baths (except open-air swimming) prevents all practice of the useful accomplishment of diving deep in water from a height or while swimming; and I am not aware of any instruction being given in the very difficult art of rescuing a drowning person. I need not say that this is a dangerous and difficult operation as long as the person to be rescued is able to struggle and clutch at his rescuer. It too often happens that the desperate efforts of a drowning person drag both himself and his would-be preserver to the bottom. In some books it is reccommended not to attempt the rescue of a drowning man until he has ceased to struggle, when it may be too late. There is a method of grasping and supporting a drowning person, however lively, that should be taught to swimmers, which will enable them to save life without much peril to themselves; and this could be taught in our swimming baths. By the way, either Shakespeare understood little about swimming, or he intended to represent Cassius as a vain boaster, which, however, is hardly consistent with his character in the play, when he makes him talk about rescuing the drowning Cæsar by taking him on his shoulders as Æneas did Anchises.

I must remind the reader that in order to derive the full health-giving advantages from swimming, it must be performed in cool and deep water, with plenty of room, and surrounded by the wholesome accessaries of fresh air and sunlight. Moreover, the mind of the swimmer should not be harassed and anxious.

And here I should say a few words respecting the prejudice in favor of sea-bathing, which is almost universal. It is believed that there is something in the sea-water that renders it far more salutary than fresh water. This is undoubtedly true with respect to certain morbid states of the body—such as scrofula; but it is far from being universally true. To many persons the sea-side and sea-water are little else than poisonous, and bathing in the sea, or mere residence near the sea, produces very prejudicial effects. To most healthy persons it is not the contents of the water that do good, but the exercise and the reactions caused by the temperature and the other elements I have indicated above. By many swimming in the sea is preferred to swimming in fresh water, for various reasons, independent of any medicinal action of its salts. They like the charm of bathing in the boundless ocean, with all its romantic accompaniments; they swim with greater facility and confidence, as the greater specific gravity of salt water floats them higher. It may be urged that medical men invariably send people to the sea for bathing. That is nearly true; but then medical men are not altogether free from sharing the prejudice in favor of the superior salubrity of sea-water. Moreover, it is for patients their advice is sought, not healthy persons, and the maladies these patients are suffering from may seem to them to require the medicinal effect of sea-water. But undoubtedly the chief reason for their recommendation is that they know that there are facilities for bathing in the sea, but they would be much at a loss to name any place where their patients could obtain comfortable fresh water open-air bathing. For my own part, though I love the sea in all its moods, and in part because it has so many moods, I dislike the sticky hair and generally dirty feeling it causes, and its nasty taste when one gets a mouthful; and I would much prefer that its waters were as soft, sweet, and cleansing as those of some of our inland lakes. There you have the changing moods of the ocean, while the water is fresh and sweet, and your body when immersed in it seems as white as marble, and, like Narcissus, you are ready to fall in love with your beautified person. Give us fresh-water baths in the open air, and a removal to the sea-side will not be desired or needed by many who

are now attracted thither. When speaking of the advantages of swimming in the open air, I have not meant that these advantages were limited to the male sex. On the contrary, I am strongly of opinion that swimming is an exercise equally, if not more, adapted to women as to men. Men have their hundreds of games and occupations that keep their muscles in constant and varied play. From these women are practically debarred, and the exigencies of society limit their exercises to but few, and some of these can only be enjoyed by the wealthier classes. The tyranny of fashion, too, compels them to dress themselves in a manner specially unfavorable to healthy exercise, and the consequence is that thousands fall into ill health which might be averted if their muscular system and circulation had only a fair chance. Swimming, which must be performed without the restraints of fashionable garments, is of all others the kind of exercise from which most advantage may be reaped. To most women, also, swimming comes easier than to men. Their bodies are generally of less specific gravity, and so float more easily in water, whether fresh or salt. This being so, they sooner acquire the confidence necessary to make good swimmers. Then, as the water sustains the whole weight of the body, and as they are no longer restrained by the bands, bones and laces of their dress, they are free to bring into full play, without fatigue, all those muscles which have hitherto been kept in thrall by the milliner's devices.

As a means of maintaining and even restoring health, then, swimming in the open air is of still greater importance to women than to men.

When women take to swimming, as I have no doubt they will eagerly when opportunity offers, they will, of course, have to abandon their useless and inconvenient bathing-gowns, and adopt the dress universally worn by their sisters on the continent, or something equally well adapted to allow free play to the limbs.

Decaying vegetable matter is much more poisonous than decaying animal matter.

Sir J. Y. Simpson. — The weight of Sir James Y. Simpson's brain, including the cerebellum, was 54 ounces. Whilst, as is well known, the ratio between intellect and size of brain is by no means close, yet there can be no doubt that it is very important. Most of our great men have had large crania. The male brain ranges chiefly between 46 and 53 ounces, its average being 49½ (Quain and Sharpey). That of Cuvier is stated to have weighed 64 ounces, and that of the late Dr. Abercrombie 63 ounces; but it is possible that some error may have crept in through the use of weights of differing standards. If not, Sir James's brain, whilst much above the average, did not nearly reach those of the celebrated men we have mentioned; but, at the same time, the convolutions were remarkably numerous. "They were," says a correspondent, "twisting and twining round on each other as if they could not find room within the head. The 'Island of Reil' was very wonderful."

The First Subject of Anæsthesia. — "Dr. Simpson, on first propounding the theory of the application of chloroform to patients requiring surgical aid, was stoutly opposed by certain Calvinistic objectors, who held that to check the sensation of pain in connection with 'visitations of God' was to contravene the decrees of an All-wise Creator. What was his answer? That the Creator, during the process of extracting the rib from Adam, must necessarily have adopted a somewhat corresponding artifice — 'for did not God throw Adam into a deep sleep.' The pietists were satisfied, and the discoverer triumphed over ignoble and ignorant prejudice."

Left-Handedness. — According to Professor Hyrtl, "It happens in the proportion of about two in a hundred cases that the left subclavian artery has its origin *before* the right; and in these cases left-handedness exists, as it also often actually does in the case of complete transposition of the internal organs, and it is found that the proportion of left-handed to right-handed persons is also about 2 to 100. He thinks that ordinarily the blood is sent into the right subclavian under a greater pressure than into the left, on account of the relative position of these vessels, that in consequence of the greater supply of blood the muscles are better nourished and stronger, and that therefore the right extremity is more used.

During the past year, no less than 5 011 persons committed suicide in France — 4,008 men, and 1,003 women.

Ventilation. — It is more difficult to ventilate a close room in summer than in winter; because in summer there are no fires to create a draft, or to move the air; but an open fireplace, or an open door, or long windows, open at top and bottom, may be sufficient.

[We republish the following by request; believing that it will also prove useful at this season of the year.]

These two Illustrations, Nos. 1 and 2, show the position of the Body during the employment of Dr. Marshall Hall's Method of Inducing Respiration.

No. 1. INSPIRATION.

DIRECTIONS FOR RESTORING THE APPARENTLY DROWNED.

The leading principles of the following Directions for the Restoration of the apparently Dead from Drowning are founded on those of the late Dr. Marshall Hall, combined with those of Dr. H. R. Silvester, and are the result of extensive inquiries which were made by the Royal National Life-Boat Institution of England, amongst Medical Men, Medical Bodies, and Coroners throughout the kingdom. These Directions have been extensively circulated by the Institution throughout the United Kingdom and in the Colonies. They are also in use in the Navy, in the Coastguard Service, and at all the Stations of the British Army both at home and abroad.

I.

Send immediately for medical assistance, blankets, and dry clothing, but proceed to treat the patient *instantly* on the spot, in the open air, with the face downward, whether on shore or afloat, exposing the face, neck, and chest to the wind, except in severe weather, and removing all tight clothing from the neck and chest, especially the braces.

The points to be aimed at are,—first and *immediately* the Restoration of Breathing; and, secondly, after breathing is restored, the Promotion of Warmth and Circulation.

The efforts to *restore Breathing* must be commenced immediately and energetically, and persevered in for one or two hours, or until a medical man has pronounced that life is extinct. Efforts to promote *Warmth* and *Circulation*, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing; for if circulation of the blood be induced before breathing has recommenced, the restoration to life will be endangered.

II.—TO RESTORE BREATHING.

(According to Dr. Hall's method.)

To Clear the Throat.—Place the patient on the floor or ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more readily escape by the mouth, and the tongue itself will fall forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleansing the mouth.

By placing the patient on the chest, the weight of the body forces the air out; when turned on the side, this pressure is removed, and air enters the chest.

No. 2. EXPIRATION.

If satisfactory breathing commences, use the treatment described below to promote Warmth. If there be only slight breathing, or no breathing, or if the breathing fail, then,—

TO EXCITE BREATHING.—Turn the patient well and instantly on the side, supporting the head, and excite the nostrils with snuff, hartshorn, and smelling salts, or tickle the throat with a feather, etc., if they are at hand. Rub the chest and face warm, and dash cold water, or cold and hot water alternately, on them. If there be no success, lose not a moment, but instantly,—

TO IMITATE BREATHING,—Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress. Turn the body very gently on the side and a little beyond, and then briskly on the face, back again, repeating these measures cautiously, efficiently, and perseveringly, about fifteen times in the minute, or once every four or five seconds, occasionally varying the side.

On each occasion that the body is replaced on the face, make uniform but efficient pressure with brisk movement, on the back between and below the shoulder-blades or bones on each side, removing the pressure immediately before turning the body on the side.

During the whole of the operations let one person attend solely to the movements of the head and of the arm placed under it.

[*The first measure increases the expiration—the second commences inspiration.*]

*** The result is ***Respiration*** or ***Natural Breathing***; and if not too late, ***Life***.

Whilst the above operations are being proceeded with, dry the hands and feet, and as soon as dry clothing or blankets can be procured, strip the body, and cover or gradually re-clothe it, but taking care not to interfere with the efforts to restore breathing.

III.

Should these efforts not prove successful in the course of from two to five minutes, proceed to imitate breathing by Dr SILVESTER's method, as follows:—

Place the patient on the back on a flat surface, inclined a little upwards from the feet; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades. Cleanse the mouth and nostrils, draw forward the patient's tongue, and keep it projecting beyond the lips; an elastic band over the tongue and

These two illustrations, Nos. 3 and 4, show the position of the Body during the employment of Dr. Silvester's Method of inducing Respiration.

No. 3. INSPIRATION.

under the chin will answer this purpose, or a piece of string or tape may be tied round them, or by raising the lower jaw, the teeth may be made to retain the tongue in that position. Remove all tight clothing from about the neck and chest, especially the braces.

To Imitate the Movements of Breathing.—Standing at the patient's head, grasp the arms just above the elbows, and draw the arms gently and steadily upwards above the head, and *keep them stretched* upwards for two seconds. *(By this means air is drawn into the lungs.)* Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest. *(By this means air is pressed out of the lungs.)* [See Engravings 3 and 4.]

Repeat these measures alternately, deliberately, and perseveringly, about fifteen times in a minute, until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing, and proceed to *Induce Circulation and Warmth.*

IV.—TREATMENT AFTER NATURAL BREATHING HAS BEEN RESTORED.

To Promote Warmth and Circulation.—Wrap the patient in dry blankets; commence rubbing the limbs upwards, with firm grasping pressure and energy, using handkerchiefs, flannels, &c. [*By this measure the blood is propelled along the veins towards the heart.*]

The friction must be continued under the blanket or over the dry clothing.

Promote the warmth of the body by the application of hot flannels, bottles, or bladders of hot water, heated bricks, &c., to the pit of the stomach, the arm-pits, between the thighs, and to the soles of the feet.

If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room.

On the restoration of life, a teaspoonful of warm water should be given; and then, if the power of swallowing have returned, small quantities of wine, warm brandy and water, or coffee, should be administered. The patient should be kept in bed, and a disposition to sleep encouraged.

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No. 4. EXPIRATION.

GENERAL OBSERVATIONS.

The above treatment should be persevered in for some hours, as it is an erroneous opinion that persons are irrecoverable because life does not soon make its appearance, persons having been restored after persevering for many hours.

Appearances which generally Accompany Death.

Breathing and the heart's action cease entirely; the eyelids are generally half closed; the pupils dilated; the jaws clenched; the fingers semi-contracted; the tongue approaches to the under edges of the lips, and these, as well as the nostrils, are covered with a frothy mucus. Coldness and pallor of surface increase.

CAUTIONS.

Prevent unnecessary crowding of persons round the body, especially if in an apartment.

Avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured.

Under no circumstances hold the body up by the feet.

On no account place the body in a warm bath unless under medical direction, and even then it should only be employed as a momentary excitant.

DROWNING.

The actual condition is here due to the same cause as in death by hanging, — the non-entrance of air into the lungs. If repeated attempts at breathing be made while the patient is in the water, air will escape from the chest, and water may pass into the air-passages, but this intrusion of water is no necessary condition of drowning.

Hence no attempts need be made, as our forefathers taught, to remove the water from the chest, by rolling the body face downwards on a barrel, etc.

INSTINCT AND REASON.

DO animals reason, or are all their actions and operations dictated by mere instinct? On this point, the opinion of Locke, admitted on all hands to be one of our deepest thinkers, and to be rarely at fault in his deductions, is worth attention. "It seems," he observes, "as evident to me that some of them [brutes] do in certain instances reason, as that they have sense;" and the illustrious Cuvier, after illustrating his proposition that at least the superior animals are gifted, to a limited extent, with mental powers, sums up his argument by saying: "We perceive in them, in short, a certain degree of reason, with the consequences, both good and bad, resulting from the exercise of that faculty in man. It resembles the dawning of intellect in the infant mind previously to the acquirement of speech."

It may be as well here to give as clear definitions of the word instinct, as distinguished from reason, as we have been able to meet with, although Kirby, following the French naturalist Bonnet, maintains that philosphers will make fruitless efforts to define it, "until they have spent some time in the head of an animal without actually *being* that animal!" This peculiar position we can scarcely expect to be realized, and therefore we must be content to do our best without the knowledge to be attainable by such transmigration of soul!

Instinct has been characterized by one author as "a natural impulse to certain actions which animals perform without deliberation, and without having any end in view, and without knowing why they do it." Or, it may be described as "an involuntary desire or aversion prompting to action without the intervention of reason, motive, or deliberation, but tending uniformly and exclusively to the preservation of the individual or propagation of the race." Many familiar examples might be adduced in illustration, but a very few will be sufficient for our purpose. A bee, when emerged from the chrysalis, immediately on becoming dry and gaining the full power of its wings, sets itself to work to construct a cell, or wanders forth to add to the general store, being just as expert in either operation as "the oldest inhabitant" of the hive. The common large white butterfly, laying its eggs on the cabbage — the tortoise-shell butterfly, on the nettle — intuitively secure for the young caterpillars, when hatched, a plentiful supply of their proper food — a food, be it observed, that the parents themselves do not use. It is perhaps needless to remind the reader that *lepidopterous* insects (butterflies and moths) in the perfect state live, by suction, on the nectar of plants. The dragon-fly, which lives in the air, drops her eggs in the water, an element which the young are destined to inhabit. Still more admirable is the instinct by which the gad-fly insures an entrance for its young into their strange dwelling-place, the stomach of the horse. It fastens its eggs by means of a glutinous substance to the hairs of his skin, and numbers of the tiny grubs, when hatched, are conveyed thence by the animal's tongue when licking himself: from the mouth they easily pass into the stomach. But what is strikingly worthy of notice is, that the insect never deposits its eggs on any part of the horse's skin which lies out of reach of his tongue. It is impossible to imagine human foresight more perfect. A pair of young birds build their nest for the first time of the same materials, display as much neatness and skill in the formation, and fix on as desirable a situation for it, as the most experienced of their species. The young of aquatic birds, when released from the shell, at once seek their proper element; and that this is as much the result of a natural instinct as an exercise of the imitative faculty, is demonstrated by the eagerness with which ducklings, hatched under a hen, betake themselves to the nearest piece of water, to the grievous perturbation of their alarmed foster-mother. By the same guidance most animals are enabled to avoid unwholesome or poisonous food, and to select that which is the very best fitted for their nourishment.

A very remarkable anecdote of instinct in an ass, an animal, as Mr. Kirby remarks, not famed for its sagacity, was related to him by a friend who personally knew the facts. The ass had been shipped at Gibraltar, on board the Ister frigate, bound for Malta. The vessel, at some distance from land, struck on a sandbank off the Point de Gat, and the ass was thrown overboard in a very high sea, to give him a chance of swimming to the shore. A few days afterwards he presented himself at the stable which he had been accustomed to occupy in Gibraltar, and it was supposed that, through some oversight, he had not been taken on board the frigate. The vessel having to return to Gibraltar and refit, the matter was cleared up, and it was found that the ass had not only got safe to land, but actually made its way a distance of two hundred miles, through a rugged country intersected by streams, where he had never before been, and in as short a time as the journey could be performed, which proved that he must have kept a straight course throughout, neither diverging to the right or left.

These few instances will serve to exemplify what is meant by the operation of *simple instinct*.

We get upon more difficult ground when we come to consider what are called *modifications of instinct*; that is, the deviations of the instincts of animals, and their accommodation to circumstances; and these variations, as Kirby observes, are chiefly noticeable among the insect tribes. They often exhibit the most ingenious resources, their instincts surprisingly accommodating themselves to the new circumstances in which they are placed, in a manner more wonderful and incomprehensible than the existence of the faculties themselves.

Kirby, writing on this subject, relates some interesting facts, some of which we shall transfer to our pages. He quotes from Bonnet the instance of a caterpillar which that naturalist confined in a box, and which being denied access to the bark of which, in a state of freedom, its cocoon would have been constructed, formed that shelter for itself out of scraps of paper, fastened together by silk.

The caterpillar of the common cabbage butterfly, when changing into the chrysalis, usually attaches itself to the under side of a projecting wall coping, or some similar shelter, by a fine thread passing round its middle; and, to secure the adhesion of the ends of this thread to the smooth surface of the stone, otherwise a doubtful matter, commences its operations by weaving a silken web over a sufficient portion of the stone, to which web the "waistband" is attached. A few of these caterpillars having been reared in a box covered with a muslin lid, previously to passing into the chrysalis state, fastened themselves to this lid without concerning themselves about the usual web, the substance of the muslin furnishing a sufficient hold for the thread.

It is the habit of several of the humble-bees to roof their nests with a thick vault or coping of moss. Huber covered with a bell-glass a nest of one of the commonest species (*Bombus Muscorum*), and, the glass being placed on an uneven surface, "he stuffed up the interstices left with a linen cloth. This cloth, the bees, finding themselves in a situation where no moss was to be had, tore thread from thread, carded it with their feet into a felted mass, and applied it to the same purpose as moss, for which it was nearly as well adapted. Some other humble-bees tore the cover of a book with which he had closed the top of the box which contained them, and made use of the detached morsels for covering their nest." Huber also made some interesting experiments, showing that, in particular circumstances, bees can alter the form of their cells.

This whole subject is, by the confession of the wisest and most painstaking philosophers, beset with difficulties. Who can say where instinct ends, and reason takes its place? Kirby himself was in doubt under which head to arrange many of his illustrations, and confesses that, in his original manuscript, he had adduced several facts as instances of the operation of reasoning powers, which, on more deliberate reflection, he had come to the conclusion were the results of instinctive adaptation to exceptional circumstances.

Let us now inquire upon what grounds the possession of reason — be the amount more or less restricted — has been attributed to the animal creation. Their attachment to and care of their offspring are without doubt almost invariably referable to instinct, as we find that when the young are able to shift for themselves, the parental solicitude is at an end: and indifference, or even repulsion, takes its place. But do not the gratitude and devotion evidenced by many animals to their human protectors proceed from a higher principle? It seems almost superfluous to mention the dog, of whose fidelity and affection for his master such innumerable anecdotes are related — and yet, to write upon the present subject, and not assign him a prominent position, would be almost as unsatisfactory a performance as "the play of 'Hamlet' with the part of Hamlet left out."

Mark the intelligence and delight expressed in his every feature, when, from his comfortable siesta on the hearth-rug, he hears the well-known voice in the hall, or the equally well-known footstep, and rouses himself at once, his whole frame, from the point of his nose to the tip of his tail, vibrating with excitement. And, the door opened, how he bounds forward, to the great terror of some timid youngster in the way; and, planting his great paws upon his human friend's ribs, with earnest gaze of all but human expressiveness, says, as plainly as dog can do, "How *very* glad I am to see you home again; I've been longing so for you to come back." Perhaps you are resting in your easy-chair by the fire, with your favorite companion dozing at your feet. You suddenly address him as "Good old dog"; how gratefully and lovingly he looks up at you in return for the slight attention: if so thoroughly sleepy that he cannot open his eyes properly, he yet makes you an acknowledgment of it by one or two lazy wags of the tail. He never meets your advances with the chill indifference you often find among your fellow-mortals.

And these dogs are no "summer friends"; but in the hours of sickness, adversity, and distress, cleave to those who have protected them, and repay their care with tenfold assiduity. We knew a spaniel of the King Charles breed, who, when his mistress was in her last illness, lay upon the bed looking mournfully at her, and, for the closing days of her life, never moved from his self-chosen

position, except for a few minutes at a time. He appeared to know the moment of her departure, for, before the attendant relatives were aware that all was over, he set up a long pitiable howl, having previously only showed his sorrow by silent watching.

Very many touching stories have been recorded of these creatures; of their grief at the loss of those they have loved, and the almost impossibility of separating them from the cold remains; and how, when these are hid from their sight, they will, for days, months, even years, constitute themselves the unwearying guardians of the mound of earth which marks the spot. The circumstance which occasioned the composition of Scott's beautiful poem, "Hellvellyn," is well known. An amiable and highly talented young gentleman, who was in the habit of taking long rambles through the counties of Cumberland and Westmoreland, attended only by a favorite terrier, perished by losing his way, in the spring of 1805, on the above mentioned mountain. His body was found three months afterwards, still watched over by the faithful companion of his solitary excursions. The poetry of Sir Walter is not so much in fashion as it used to be, and as it is possible that the lines may be new to some of our younger readers, we venture to quote two out of the five musical stanzas which compose the poem: —

"Dark green was that spot 'mid the brown mountain-heather,
Where the Pilgrim of Nature lay stretched in decay,
Like the corpse of an outcast abandon'd to weather,
Till the mountain-winds wasted the tenantless clay.
Nor yet quite deserted, though lonely extended,
For faithful in death, his mute favorite attended,
The much-loved remains of his master defended,
And chased the hill-fox and the raven away.

"How long didst thou think that his silence was slumber?
When the wind waved his garment, how oft didst thou start?
How many long days and long weeks didst thou number,
Ere he faded before thee, the friend of thy heart?
And, oh, was it meet that — no requiem read o'er him —
No mother to weep, and no friend to deplore him,
And thou, little guardian, alone stretched before him, —
Unhonor'd the Pilgrim from life should depart?"

A Pig under Chloroform. — A patient in the Kendal workhouse had undergone a painful surgical process for the performance of which the administration of chloroform was judged needful by the operator. It happened to be pig-killing day, of which the indications were loudly apparent, when it occurred to the worthy practitioner to suggest the same opiate to the doomed grunter. The hint was acted upon, the sponge applied to the animal's nostrils, and in a moment he was as quiet as a lamb. In this unsuspecting condition the poor victim had the knife applied to its throat, and with a result every way satisfactory and complete. — *The Lancet.*

Dr. Duncan, a professor in the New College, Edinburgh, was a very "absent-minded" man. The doctor was coming out of the college one day, when a cow brushed slightly against him; the doctor mechanically lifted his hat, and muttered, "I beg your pardon, ma'am." He was a good deal rallied about this, and a day or two afterwards, as he was again coming from his class, he stumbled against a lady, and at once exclaimed, "Is that you again, you beast?"

Swift proposed to put a tax on female beauty, and to leave every lady to rate her own charms. He said the tax would be cheerfully paid, and would be very productive.

Etymology. — "Why are doctors called physicians, mamma?" said a little inquisitive girl to her mother, who had just been visited by one of them. "Physicians," replied mamma, who was seldom at a loss for an answer, "comes from *feeseek*, as the doctors ride about all day to seek fees."

"This insurance policy is a queer thing," said Dobbs, reflectively. "If I can't sell it, I can-cel it; and if I can-cel it, I can't sell it."

Hope is the best medicine, and fortunately it is in the power of every doctor to dispense it.

Happiness is a perfume that one cannot shed over another without a few drops falling on one's self.

Experience is a flannel waistcoat that we do not think of putting on, until after we have caught cold.

Wise persons, when they take advice, go to a Physician, but fools go to a Quack; and the large disproportion between the two classes explains why so many Quacks make their fortune, whilst many a clever Physician starves.

Scandal, like a kite, to fly well depends greatly on the length of the tale it has to carry.

Habit is a cable. We weave a thread of it every day, and at last we cannot break it.

KINDNESS.

Wide is God's great world around us,
Room enough for all to live;
Mar no creature's brief enjoyment —
Take not what you cannot give.

Ever let your heart be tender,
For the mute and helpless plead:
Pitying leads to prompt relieving,
Kindly thought, to kindly deed.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Third Paper.

PURE AIR.

Ventilation.

PROMINENT among the causes of disease is a deficiency of pure air. The function of respiration is known to consist mainly in removing from the blood the carbonaceous results of the waste of our tissues, by permitting them to combine with the oxygen of the air we breathe, and to be exhaled in the form of carbonic acid. It is easy to see that in a crowded and ill-ventilated room, without the adequate supply of oxygen, this carbon cannot be eliminated in sufficient amount; in consequence of the impurity of the air, and the retention of carbon in the blood, there arise difficulty of breathing, feelings of oppression in the region of the heart, headache, and even faintness. Important as is pure air in the occasionally visited churches, theatres, and places of amusement and instruction, it is still greater in the factory and workshop, where men and women pass the whole day, and in the chambers where they sleep.

The great neglect of physical education, so obvious in the treatment of children, is carried still farther by the absence of all sanitary arrangements in the houses and shops of the mass of the people, — showing that architects and builders know nothing or care nothing about the requisites for the health of the occupants. Compelling workmen and workwomen to remain for many hours daily in a close, unventilated room, is not only cruel, but is a positive and very active influence undermining the health and diminishing the power of a community. Most of our factory operatives are females, in whom the physical degeneration, from this cause principally, is painfully manifest; this is one of the "woman's wrongs" that deserves the profound and immediate attention of philanthropists.

Sleeping Apartments.

Most of civilized human races pass about half their lives in bed, so that the manner in which people *sleep* is a matter of great importance; yet very little attention is paid to it. When practicable, one child, and indeed one adult, is all that one bed ought to contain; and if each bed had its separate apartment it would be better still; the emanations of the human body, much more than the trifling excess of carbonic acid in air which has been repeatedly breathed, are the sources of impurities in chambers, and spread the seeds of debility and disease. A sleeping room should be well aired by a fire-place kept open day and night, or by some means of ventilation beside the windows; with all the modern theories and pseudo-science of ventilation, there has been no great improvement on Benjamin Franklin's way of slightly raising the lower and dropping the upper sash of a window, so situated that the sleeper shall not be exposed to a direct draught. Mechanical

contrivances may answer for public buildings where power is available; but for domestic and every-day use some simple modification of a chimney-top, depending for its action on the natural ascensional power of heated air, assisted by the wind from whatever quarter it may blow, must be depended on,—such a one, for instance, as the Boyd cap, which seems to be simple, effectual, cheap, and not liable to get out of order.

Air vitiated by Exhalations.

The vitiated air must not only be removed by some such contrivance as this, but a regular and constant supply of fresh air from without must be provided, — in winter, through the heating apparatus, and duly warmed, in summer directly from the outer air, *not from the cellar*, through proper pipes leading to each room. The amount of air required per minute to maintain the purity necessary for healthy respiration may be taken at about ten cubic feet per minute for each person. The amount actually rendered impure by respiration is small compared with that required to absorb and render innocuous the organic exhalations from the lungs, skin, and clothing of the individuals occupying a room; these exhalations cause the foul odor of an ill-ventilated room, and are far more injurious, as well as more disagreeable, than the carbonic acid. It is stated that ten per cent. of carbonic acid mechanically mixed with common air is not so injurious as two per cent. in air vitiated by respiration and the body's exhalations. The exchange of oxygen and carbonic acid in respiration does not contain the whole, or even a considerable portion, of the science of ventilation; the foulest air of a railroad car, or a crowded hall in winter, is deficient in oxygen to a degree which may be made up by a few extra inspirations; the amount of carbonic acid in such places is very much less than what workmen in soda-water factories breathe for hours with impunity. The great source of impurity is the organic matter rejected by the lungs and skin; and to detect this, we have an unerring guide in the sense of smell; whenever, therefore, we put our noses into a room, and our sense of smell tells us of the presence of this unmistakable organic impurity, we must retreat *at once;* if we enter, our guide soon deserts us, and we breathe the poisoned air without apparent harm; as familiarity with vice soon blunts the moral perception, so remaining a short time in foul air blunts our sense of smell, and we unconsciously, perhaps defiantly, expose ourselves to the germs of various diseases which are always floating in the air, ready to become vitalized when they find a proper nidus in the human body. So thoroughly were the ancient lawgivers imbued with the truth of this, that cleanliness of the body was made a part of their religion; we have also an adage, whose truth we can appreciate from the above point of view, viz., that "cleanliness is next to godliness"; with the lights of modern hygiene we may go farther than this, and say that bodily filth is incompatible, not only with the sound health, but with the morality and religion of a community.

The prevalent modes of warming our houses by furnaces and stoves, for convenience and economy, do not favor a free circulation of air, and should not be used in tight apartments. In our cold climate, it is difficult to solve the combined problems of warmth and ventilation. The open fire-place is the great natural ventilator of a room; and in our best houses, in addition to the registers for heated and pure air, we ought to find a fire upon the hearth for the purposes of ventilation; the expense of the extra fire will be more than compensated by the dimunition of the doctor's bills, and, what is of far greater importance, by the increased health and happiness of the household. The practice of many people of keeping up a sufficient fire to allow the windows to be kept open, is an excellent way to secure a plenty of fresh air; when this would be too expensive, an augur-hole for every member of the family in the sash of the most crowded rooms, is a very good substitute. It

must also be remembered that lamps, gas-burners, and whatever is in a state of combustion in a room, are consuming oxygen and evolving carbonic acid, and to that extent using up the air we require for the purification of our blood; it is estimated that an ordinary gas-burner consumes as much oxygen as a healthy adult. The amount of air we introduce must, therefore, be ample for all these additional consumers in the household.

Sunshine.

Sunshine is of no less importance than pure air. Dr. Bowditch's statistical tables go to show the intimate relation between the occurrence of consumption and its allied diseases, not only in years where there have been an unusual number of cloudy days, but in places naturally, and in houses designedly, deprived of the free access of the sun's rays. Some time ago this fact was signally illustrated by a district of Paris, where the people were pallid and filthy from the absence of sunlight in their dwellings; the government interfered, and shut up the places. There are not a few tenement-houses in all our large cities where such a procedure would throw light not only upon moral and physical nastiness, but upon the causes of disease and death among the poor foreign population swarming and festering in our midst. Let the sunlight into your houses, then, and drive away the mould and mustiness which lurk in your halls and closets, and even in your parlors; far better that the carpets, and chairs, and curtains should fade, than that the rosy tints of health should disappear from the lips and cheeks of your children. The rays of the glorious sun are necessary for vegetable and animal growth, and above all necessary for the healthy growth of the human being; open, then, your curtains and blinds, and see how quickly the sun will change the atmosphere of your house, bringing light and warmth into musty corners, vivifying the air of every room, reddening the cheeks of the pallid children, and giving to every member of the family a vigor before unknown. No wonder the eastern nations worshipped the sun as the source of life, and light, and heat; let us open to him our houses, and let him have an altar in every room therein.

Neglected Cellars.

Pure air and sunlight may enter our houses, and yet every room be more or less infected by emanations from neglected cellars. A damp and foul cellar is a perpetual source of danger; decaying vegetable and animal matters are the favorite nesting-places of the seeds of disease, which so frequently spread death in a mysterious way. The inmates of many a palatial residence have been suddenly and consecutively stricken down from inattention to a defective drain, or soil-pipe, or other source of disease lurking in the generally neglected cellar. The sun and air must, then, enter also the cellar, as must also the eyes and nose of the proprietor, or the deleterious effects of this neglect will be fearfully apparent.

Earth Closets, etc.

In suburban residences, and where an ample supply of water cannot be obtained, a most fruitful source of annoyance, and often of disease, is the foul odor from the privy. By the use of the "Earth Closet," we may be relieved from the evils attendant on carelessness, negligence, and ignorance in the removal and disposition of human excreta; by it the ordinary commode may be used in bed-rooms and closets without offensive odor. Its use depends on the well-known power of *dry earth* as a deodorizing agent, more economical and of wider utility than the water-closet, and leaving a product of great value to the agriculturist. Time will not allow further allusion to this excellent invention, other than to assure our readers that *dry* earth, *at once* applied, will *instantly* remove all foul odor from human excrement, whether in the chamber or in the privy; and this inodorous product, where earth is scarce, may be used several times over, giving out no odor, and becoming each time a more valuable fertilizer. The importance of this in the sick-

chamber, and in places where water is scarce, can hardly be over-estimated; it removes a serious cause of disease in the house, and enables the farmer to convert his privy from an ever-present nuisance into an odorless source of profit.

The eccentric Dr. Darwin, who died about 70 years ago in England, occasionally trangressed the laws of strict sobriety. Once, on a boating party, he became highly exhilarated; as the boat approached Nottingham, he surprised his companions by slipping into the middle of the river and swimming ashore. His companions landed as soon as possible, passed to the market-place, and there found the Doctor, standing upon a tub, and addressing the populace in the following language, which no sober man could surpass in its just appreciation of the value of fresh air, and with which, therefore, we will close this portion of our subject: "Ye men of Nottingham, listen to me. You are ingenious and industrious mechanics. By your industry, life's comforts are procured for yourselves and families. If you lose your health, the power of being industrious will forsake you. *That* you know; but you may not know that to breathe fresh air constantly is not less necessary to preserve health than sobriety itself. Air becomes unwholesome in a few hours, if the windows be shut. Open those of your sleeping-rooms, whenever you quit them to go to your workshops. Keep the windows of your workshops open whenever the weather is not insupportably cold. I have no interest in giving you this advice. Remember that I, your countryman and physician, tell you. If you would not bring infection and disease upon yourselves, and upon your wives and children, change the air you breathe; change it many times a day by opening your windows." So saying, he descended from the tub, and was led away by his friends, leaving this sound advice for their and our in-instruction.

ADULTERATION. — It is really becoming a difficulty to say where the limits of adulteration are to be found. It seems to be the only one of the fine arts whose province approaches the ubiquitous. Our soap is tinctured with a fine white clay. The house-painter, as he coats our furniture or doors, uses white lead with his carbonate or sulphate of barytes, and red lead with his vermilion. The weight of printing paper is often increased by plaster of Paris. To come to drinkables, immature red wines owe no inconsiderable measure of their astringency to oak sawdust and the husks of filberts.

The transparency of cloudy white wines is imparted by gypsum; and where, we should like to know, does the deep, rich purple tint of much of our port come from, if not out of the skins of elderberries and bilberries from Germany, and wood from Brazil? Indeed, it is no secret that much of our port itself is "doctored," and under its name thousands of pipes of spoiled cider fetch an excellent price. The flavor of French brandy is successfully mimicked by distilling molasses spirit over wine lees. Indeed, as far back as the age of the "Tattler," there existed "a certain fraternity of chemical operators, who, working under-ground in holes, caverns, and dark retirements, by the power of magical drugs and incantations, raised under the streets of London the choicest products of the hills and valleys of France." The bitter of ale is often wormwood, and the brown of stout Spanish liquorice; while the commonest alcohol of all is freely associated with hartshorn, coriander seeds, and nux vomica. Nor is what we eat much more immaculate than what we drink. The potatoes, which are sometimes said to improve our bread, are much cheaper to the adulterator than the food into which he transplants them. Spoilt flour is metamorphosed into a light porous article, after being submitted to the influence of sub-carbonate of ammonia. But the staff of life is most often supported by a mixture, most appropriately called "stuff," composed of one part of alum in minute crystals, and three of common salt.

MUSCULAR MOTION.

MOST men believe in two things, viz., —*force* and *matter*, but the one is so intimately blended with the other, that, apart, we can hardly, if at all, recognize them. Now, of late years, since the sciences called the natural sciences have been more and more studied, men have set themselves to work to investigate what is called force, and have found that what were formerly held to be separate and distinct forces, or, as people then preferred calling them, imponderable bodies, that is to say, substances which could not be weighed, and which had none of the other ordinary properties of matter, although they called them such, were in reality identical, and that one force passed into another kind of force, insensibly it might be, but not the less surely on that account.

To take an example: formerly men held electricity, magnetism, chemical force, heat, light, and motion, to be things totally different and distinct. Nowadays most men look upon these as one and the same, modified variously but still identical; so that either can take the place of the other. As the simplest of these, motion has been accepted as a kind of starting-point, and hence all the various forces we have mentioned above, as well as certain others we might name, are held to be *modes of motion*. Everybody has heard of the plan adopted by some savage races to kindle their fires, when live embers are not to be had, and where lucifer matches are unknown. They rub together two pieces of dry wood until one or the other takes fire, and thus effect their purpose. Now, what have we here? We shall not yet speak of the changes within the body which movement implies, but, starting with the motion given to the two pieces of wood, we see how motion gives rise to heat, how heat ends in flame — that is, light-giving chemical change — and so on; for with chemical change begins a new series. Thus, when two metals of opposite characters are acted upon by compound substances, like oil of vitriol, or aqua fortis, or blue vitriol, chemical change goes on, and electricity shows itself, as in the ordinary galvanic batteries, which are now familiarized to the public at the different telegraph stations. Electricity, in its turn, acting on a bar of soft iron, makes it a temporary magnet, which has the same powers for the time being as a loadstone. Electricity may also easily be converted into light and heat, as in the electric light which is now used in England as a beacon to sailors at Dungeness and other lighthouses; in the better known and far more dangerous form of lightning; and in the sparks which may be drawn from the back of a cat by stroking her fur the wrong way on a frosty night. A more common illustration of motion converted into heat and light, or combustion, i. e., where there is chemical change, is seen when, by the friction of a long run, the axle of a railway carriage sets on fire the carriage to which it is attached. So much, then, for illustrations of the change of one kind of force into another. Now we must speak of those which take place within the human body.

In the human body, as in all other machines, every movement implies a chemical change, for wherever force, of whatever kind, makes itself apparent, there is change at the same time. As to the different kinds of change within the body, we do not now speak; we only deal with that implied in muscular motion.

What, indeed, we chiefly wish in this paper, is to illustrate the mechanics of the human body; to show, in other words, how much of the *machine* enters into its constitution and its various actions. For our purpose, no more apt comparison can be drawn than that which is afforded by the steam-engine, to which, indeed, the human frame presents many analogies. In the first place, then, we may assume that the steam-engine is composed of certain masses of iron, steel, and brass, arranged in certain definite forms, whilst

the human body, from our present point of view, may be assumed to be made up of certain bones, muscles, tendons, ligaments, blood-vessels, and nerves, also arranged in a definite fashion. And whereas the masses of metal composing the steam-engine would be useless without the intervention of heat produced by some substance, such as coal or coke, and acting through the medium of steam produced by the action of heat on water, so the mechanism of the human body would be altogether useless without the food which we daily consume. Food stands in much the same relation to the human body as fuel does to the steam-engine. But the food of human beings is destined to fulfil other ends besides those implied by the fuel of the steam-engine, and in this way. The steam-engine, after being constructed, daily wastes. Every day it becomes worse, for each stroke of its piston, to say nothing of the motion of its other parts, implies a waste of the piston itself, and of the cylinder in which it is enclosed, and in which it works. Now, when these get out of order, the whole machine has to be stopped, that the engineer may repair the deteriorated portions; but this is impossible in the animal frame, without death ensuing. So that the human body is to be looked upon as an engine constantly working, constantly wasting, and constantly repairing its own deficiencies. But, just as the coal which is used to drive the steam-engine would be useless for the repair of the brass or iron of which the engine is composed, so would that kind of food which is most useful in supplying the means of motion in the human body be useless for repairing the waste of its tissues.

From this we are led to conceive that human food must consist of more than one kind of material, and so it does. If we take the staple of life as consisting of bread and meat, we find there the necessary substances; for bread, especially white bread, consists chiefly of starch, which may be likened to the coal of the steam-engine; whilst meat consists of two portions, the fat and the lean, of which the former goes to aid the starch in propelling the machine, the latter going to repair the waste entailed by the action of the two former. Now how should we set about finding out how much work a steam-engine had done in a given time? Not surely by estimating the infinitely small amount of refuse produced by the waste of the iron and brass, but rather by the amount of coal consumed. So in the human body, the work is to be measured by the starch and fat used up, or rather, by the products of these, not by the waste of the muscles or the meat in a changed form. Nevertheless, this error was for a long time made in the case of man, and has only recently been exploded.

Now, as to the different kinds of motion observed in man or other animals, certain of these are common to all kinds of bodies, animal and vegetable, as well as mineral. Of such kinds are the motion implied by chemical change, by heat, and the more marked phenomena of gravitation; but, besides these, there are certain partly physical, partly vital phenomena, such as result from the commingling of oil and water, especially if the latter contain a substance like the white of egg. These movements were first observed by a well-known and distinguished botanist, named Robert Brown, whence the movements are sometimes spoken of as the Brunonian, or, on account of the small size of the bodies concerned, molecular movements.

If we make the acquaintance of some of the lowest forms of animals and vegetables, we find ourselves on a kind of neutral ground, the inhabitants of which might belong to either kingdom, and to which of these they do really appertain it is not easy to say. Many of these lowly forms of animals and plants consist of a kind of jelly-like material, apparently of nothing else. They have no organs of sense, no organs of digestion even, or of circulation. Still these little structureless particles have the power of motion, and even of destroying beings much higher than themselves in the scale of animal life. From one of these living masses of jelly, called an *amœba*, this kind of motion, by the protrusion of certain portions of the

mass in any given direction, ultimately followed by the whole, has been termed *amœboid.* Still this variety of motion, not depending upon gravitation, but on the vital action of the living being, necessitates chemical change, and consequently food. It is, indeed, seen even in man, in whose veins, and constituting a portion of his blood, flow certain small rounded and colorless bodies called white blood corpuscles, which frequently exhibit similar changes; often, also, particles of the same kind in other parts of the body do the same thing.

Mounting to a somewhat higher stage in animal life, we encounter a number of beings furnished with little fringe-like processes, which they can keep in constant motion. These fringe-like processes are termed *cilia*, and their motion is called *ciliary*; it may be used to illustrate a point to which we shall again have occasion to refer. The minute beings furnished with cilia are not unfrequently fixed to one spot, without the power of changing their place of abode. In these beings the cilia are useful for setting up currents in the water by which they are surrounded, by which currents particles of food may be driven to the creatures which are deprived of the means of going in search of it. But in others, which are free, the motion of their cilia in the surrounding water resembles in its effects those of the screw of a steamer, for thereby the little beings are rapidly propelled from one point to another. Perfectly similar are the effects of a steamer's screw, which, the steamer being firmly fixed, would only be able to set up currents in the water, but which, when the vessel is free from the shore, drives it rapidly along. This same kind of motion is also observed in certain parts of man, notably in the air passages, which are lined by these little bodies constantly waving about, and tending to drive any wandering particle which may have found its way into the lung back to the outer air.

Still, all these kinds of motion, as seen in the animal frame, sink into insignificance when compared with that induced by the special apparatus prepared for the purpose, and which we term the muscles; that is to say, the red fleshy parts of an animal. It is with this kind of motion we have mostly to deal, and this apparatus we must carefully describe. There are, then, two kinds of muscles, one set more or less completely under the control of the will, the other more or less completely beyond this; the one kind is seen to most perfection in the powerful muscles of the arm and leg, the other in such an organ as the churning apparatus of the stomach. It is with the former we now must deal, and it will be enough, in giving an idea of its structure, to recall to the recollection of every one how a piece of meat boiled for a long time tends to become stringy. These strings are the so-called muscular fibres, which are themselves, in turn, made up of smaller and finer threads.

Then, again, each muscle has a beginning and an end, or, as they are technically termed, an *origin* and an *insertion.* Most frequently both of these are connected with bones, the one end with one bone, the other with another; but sometimes this is not so, as in the case of the muscles which move the eyeball, one end of which is attached to bone, the other to the soft structures of the eye. But as it would be very inconvenient to carry muscular structures from one point to another far distant, just as when a barge has to be dragged along by horses, a rope is used to transmit the power from the horse to the barge, so in the human body certain strong unyielding cords are employed to transmit it from the muscle to the bone; these we call *tendons.* Not unfrequently a muscle has a tendon of origin as well as a tendon of insertion; but it must be distinctly understood, that these are cords merely, which serve to transmit force from one point to another, and have nothing to do with the origin of the force, which depends on the shortening of the red muscular fibres, a property which is innate in them, and which is characteristic of them. When we examine all the muscles of the body (which number upwards of 1,000), especially those of the limbs, we shall find that the one

extremity of the majority is directed towards the centre of the body, the other towards the end of the limb, and it is the former which is most frequently termed the origin of the muscle.

If we now trace a muscle and its tendon from its origin to its insertion, we shall most probably find that it passes over a spot where two bones come together. This we term a *joint*, the bones being united in two ways, either so that the one can move upon the other, or so that both are immovable. It is with the former class we have chiefly to deal; and for our purpose we may assume that these joints are of two kinds, either ball-and-socket joints, admitting movement in every direction, as in the case of the shoulder-joint and hip-joint, or hinge-like joints, such as those of the elbow and knee, where the motions are more limited in their character, and are almost restricted to one direction. For the construction of these joints two things are necessary — smooth surfaces of bone, rendered still more smooth by a layer of cartilage or gristle, the one surface corresponding to and fitting into the other, and strong bands or ligaments extending from the one bone to the other, so as to keep everything firmly in its place, and admit of only a limited degree of motion.

Having explained the machinery, so to speak, of the human engine; having shown it to consist of certain self-contracting muscles, the pistons as well as the boilers of the machine, of tendons, its connecting rods or belts, of joints, the grooves in which the rigid bones move and work; we must fall back on certain elementary principles in order to explain fully the working of this wonderful mechanism. In every solid body there is a point, which is termed its *centre of gravity*, which being supported, the whole body will be so; and this in a solid corresponds to the point where certain lines cut each other. In the human body it will not be more to one side than another, and will correspond with a plumb-line dropped from the head when the individual is standing upright. So, again, it will be at those points in this line where the weights of the head and heels counterbalance each other. Finally, at the point where these two intersect each other, and encounter a third line corresponding with that in which the right side of the body balances the left, is the centre of gravity. In the human being this centre is situated low down between the two haunch-bones, but it varies with every movement of the body.

[To be continued.]

STIMULANTS. — One of the most remarkable phenomena which claim the attention of the physiologist, is the action of stimulants on the human organism. It is a well-ascertained fact that they are capable of supporting the organism in the absence of food; and, whatever the inclinations of individuals may have been, or still are, with regard to their use, it is certain that nations of the past and present cannot, or, at any rate, do not exist without them. Von Bibra, in his preface to "Die Narkotischen Genuss-Mittel und der Mensch," assumes the following: —"Coffee-leaves, in the form of infusions, are taken by 2,000,000 of human beings; Paraguay tea is consumed by 10,000,000; coca by as many; betel is chewed by 100,000,000; chicory, either pure or mixed with coffee, by 40,000,000; cacao, either as chocolate, or in some other form, by 50,000,000; 300,000,000 eat or smoke haschish; 400,000,000 use opium; Chinese tea is drunk by 500,000,000; coffee by 100,000,000. All known peoples of the earth are addicted to the use of tobacco, chiefly in the form of smoking; otherwise by snuffing or chewing." In corroboration of the above figures stand the reports concerning production, consumption, and taxation of these articles, from which a fair inference can be easily drawn by anybody doubting Bibra's accuracy.

WHAT people call "bile" is generally lobster, clams, or some similar indigestible food. Fasting, or a dose of physic, will remove it.

MORE people are killed by too much medicine, than are allowed to die for want of medicines.

THE MINERAL CONSTITUENTS OF VEGETABLES.

THE old opinion, that the mineral constituents of plants and animals owe their occurrence in the various organs and tissues to accidental circumstances, and that their presence is in no way necessary or essential to the life of the animal or plant, has ceased to be entertained; and it is now universally admitted that the mineral constituents, though existing only in minute quantity, are as essential as the organic elements which enter into the composition of the heat-producing and flesh-forming food. But, though the researches of modern chemists and physiologists have clearly demonstrated the necessity for these substances, yet their importance, and the necessity (increased by the small proportion in which they occur) of adopting such methods of cooking our food as may, to the greatest possible extent, preserve its mineral ingredients, is constantly overlooked. Though the quantity of mineral matter found in the vegetable kingdom is small — often less than one per cent. of the fresh vegetable — yet it is so essential, that its total withdrawal from our diet would be followed by consequences fatal to health, and even to life itself. I have recently made analyses of potatoes, turnips and carrots, in their raw state and after cooking, in order to ascertain the amount of mineral matter which is extracted by the water used in the process. The results of my analyses are contained in the following tables, which show the amount found in 10,000 parts of each vegetable both before and after cooking, and the absolute and proportional amount extracted by the water used in the cooking process.

Table I.—Showing the Amount of Mineral Matters in Cooked and Uncooked Vegetables.

	Potatoes.		Carrots.		Turnips.	
	Raw.	*Boiled.*	*Raw.*	*Boiled.*	*Raw.*	*Boiled.*
Potash,	54.79	34.94	38.00	26.03	24.66	17.56
Soda,			8.17	4.45	8.57	4.91
Lime,	3.05	2.17	4.16	3.42	4.12	3.75
Magnesia,	2.43	2.00	3.50	2.17	2.70	2.17
Oxide of Iron, Alumina,	0.45	0.39	0.60	0.62	0.31	0.20
Chlorine,	2.17	1.29	trace	trace	3.33	1.94
Sulphuric Acid,	6.53	4.09	4.17	2.21	8.65	5.07
Phosphoric Acid,	12.01	7.02	10.75	6.36	5.86	3.09
Silica,	1.91	2.00	1.01	0.90	2.17	2.60
Total,	83.34	53.90	70.36	46.16	60.37	41.29

Table II.—Amount of Mineral Matter Extracted by Boiling from 10,000 *parts of*

	Potatoes.	Carrots.	Turnips.
Potash,	19.85	11.97	7.10
Soda,		3.72	3.66
Lime,	0.88	0.74	0.37
Magnesia,	0.43	1.33	0.53
Oxide of Iron, Alumina,	0.06	—	0.09
Chlorine,	0.88	—	1.39
Sulphuric Acid,	2.44	1.96	3.58
Phosphoric Acid,	4.99	4.39	2.77
Silica,	—	0.11	—
Total,	29.53	24.22	19.49

Table III.—Percentage of Mineral Matter Extracted by Boiling from

	Potatoes.	Carrots.	Turnips.
Potash,	36.22	31.50	28.79
Soda,		45.53	42.70
Lime,	28.85	17.78	8.98
Magnesia,	17.69	38.28	19.63
Oxide of Iron, Alumina,	13.33	——	29.03
Chlorine,	37.32	——	41.44
Sulphuric Acid,	37.36	47.00	41.38
Phosphoric Acid,	41.63	40.83	47.26
Silica,	——	10.89	——
Total loss per cent. of Mineral Matter,	35.47	34.41	32.28

In looking at the above tables, it must be remembered that, within certain limits, the quantity and composition of plant ashes vary according to the soil upon which the plants have been grown, and that the amount of matter extracted from vegetables by boiling must also vary greatly with circumstances.

The figures in Table I., representing the composition of the cooked and uncooked vegetables, are each the mean of three analyses. For the analyses of the raw substance, 1,000 grammes were dried at 120 degrees c. (248 degrees Fah.), the dry residue incinerated in a platinum dish, at the lowest possible temperature, and the ash thus obtained analyzed in the usual way. Another portion of 1,000 grammes was boiled, and, after boiling, the liquid was carefully filtered, and the boiled vegetable dried, incinerated, and the ash analyzed in exactly the same way as the uncooked sample.

Table I. shows the results of these analyses; in these the carbonic acid of the ash has been omitted, as it is not a constituent of the plant, but a product of the combustion of its organic part. Table II. shows the absolute amount of mineral matter lost by 10,000 parts of the vegetable during boiling, whilst Table III. shows the percentage loss of each salt.

These tables prove to us that there is a great loss of mineral matter during the boiling of our vegetables; take, for instance, potatoes. Before cooking, 10,000 parts of this vegetable contain 83½ of mineral matter; after cooking, the same quantity contains not quite 54 parts, which represents a loss of about 35½ per cent. of the mineral matter originally present. In the carrot the loss amounts to 34½ per cent., whilst in the turnip it is 32¼ per cent.; so we may conclude that, by cooking such vegetables as these in the ordinary manner, about one-third of their mineral matter is extracted and lost. Looking at Table II., we find that this loss is chiefly in potash, and phosphoric and sulphuric acids. Of these three substances, potash and phosphoric acid are just the most valuable mineral constituents of our food. The loss of soda, of chlorine, lime and magnesia, is not of much consequence, even though it were much greater than it appears to be; but the loss of potash and phosphoric acid is of much more importance, for we depend entirely upon our vegetable food for a sufficient supply of these two substances. It is quite true that phosphoric acid occurs in other articles of food, such as wheaten flour, and consequently in bread; still, the supply is not so great that we can afford to waste from 40 to 50 per cent. of that which exists in our potatoes and other vegetables. Potash is even of more importance than phosphoric acid, and if we exclude it from our diet, our health would quickly fail. It is in consequence of eating salted provisions, in which the potash is to a great extent replaced by soda, and being deprived of sufficient vegetable food to supply this substance, that sailors become liable to scurvy; and, as a preventive for this disease, ships are supplied with lime-juice, a liquid which contains a

large quantity of potash combined with certain organic acids. If used regularly, lime-juice will prevent scurvy, and it does so on account of the salts of potash it contains. Now, what the lime-juice is to sailors, so are the potash plants, such as potatoes, turnips, carrots, asparagus, cabbage, etc., to us on land. Without these potash plants, we should be liable to scurvy or similar diseases. Potatoes do not contain so much nutriment, nor so much starch, as wheat-flour, or many other substances, but they contain this potash. If we were to discard potatoes and similar plants, and eat nothing but bread, we should undoubtedly suffer in our health, because, though bread contains a large quantity of nitrogenous matter, of starch and of phosphates, yet it is deficient in potash. If, then, these mineral matters are of such vital importance, and occur as they do, only in very small quantity, we ought certainly to take some means to prevent their waste; either we should employ the water in which our vegetables are boiled for making soups, or else adopt a mode of cooking which would not necessitate the loss of so much valuable material.—*Arthur E. Davies, Ph. D., in Food Journal.*

OVERWORK. — One day I asked the servant if any person had called, and was told some one had. "Who was it?" "Oh, it's the little gentleman that *aye rins when he walks.*" So I wish this age would walk more and run less. A man can walk farther and longer than he can run, and it is poor saving to get out of breath. A man who lives to be seventy, and has ten children, and perhaps five-and-twenty grandchildren, is of more use to the State than three men who die at thirty, it is to be hoped unmarried. However slow a coach seventy may have been, and however energetic and go-a-head the three thirties, I back the tortoise against the hare in the long run. I am constantly seeing men who suffer, and indeed die, from living too fast; from true, though not consciously immoral dissipation, or scattering of their lives.—*Dr. J. Brown's Hints on Health.*

ORIGIN OF HYGIENE. — According to Dr. Lyon Playfair, the study of sanitary science in England arose from a singular accident. The Court and Parliament were at Oxford, which had been recently drained, and the citizens had removed all accumulation of filth and garbage from the streets, lest they should offend the nostrils of their distinguished guests. The plague was raging at the time, and Oxford was the only place which enjoyed an immunity from it. Cause and effect were for the first time connected in the public mind, which was thus enlightened for the first time as to the nature of what we now call pythogenic, or filth-born maladies. Prior to that, the measures recommended by the council of the physicians of Paris for the arrest of the plague were: — That if a shower of rain fell during the day a spoonful of treacle should be taken, and that fat people should not sit in the sun. Michelet declares that for several centuries during which filth reigned supreme, not a man, woman, or child in Europe took a bath voluntarily and out of a desire for cleanliness. Out of this chronic and wide-spread filth arose the black death, the plague, the sweating sickness, and other pestilences, the consequences of bad hygienic conditions.

CLOTHES MOTHS.—The clothes moth has a great dislike to strong light, and rarely deposits its eggs in objects exposed to the full influence of the sun. When once the eggs are laid, their circulation is not to be prevented by pepper, spices, or camphor. Full exposure of our goods to daylight, and protection from damp, are our best safeguards against this destructive insect.

MEAT PRESERVED NINETEEN YEARS. Dr. Stein, while lecturing recently at Dresden, on the preservation of meat and food, produced a tin canister of good size, containing butchers' meat preserved by Appert's method, and prepared by himself in 1851. On opening the canister, which had been filled 19 years previously, the meat was found to be as fresh, and full of flavor, as when it was first placed in the canister.

GETTING CURED.

"FOR months I have suffered excruciating torments in every possible part of my body, but two applications of your lotion completely cured me." "After swallowing your pills I was restored to youth and beauty — in proof of this I enclose my carte de visite."

Such are among the cures announced. But who are these wonderful patients? — and who are the fortunate inventors of these nostrums? Why should any of us pay a five-dollar fee when for ten, or at most twenty-five cents, we can be at once delivered from all the ills to which flesh is heir, besides having our existence indefinitely prolonged? Alas! for one who derives any benefit from our quack medical philanthropists and their "perfect cures," there are fifty whose toothaches continue and whose spasms go on twinging in spite of draughts and boluses. And yet, when a man gets ill, credulity is a blessed thing. We have all met those sanguine individuals who will not believe that there is anything really the matter with them. "They have, perhaps, been a little out of sorts, but in a day or two they will be down-stairs again." Only, as the doctor leaves the house, he whispers to the confidential man, "Your master's very ill — it would be as well to get his lawyer to look in." But for all that, the sanguine man, who, when he is too ill to ride, has his horses trotted out before him — or his business books brought up-stairs because he is "all right," and can look after his own affairs, and is not going to put his nightcap on before he goes to bed — such a man, every doctor will tell you, has a great advantage over your nervous subject. He is credulous, but his credulity is on the right side; he may not believe in physic, but he does believe in health, and not till almost the last moment will he be induced to set his house in order.

The public are exceedingly credulous about what can or cannot be done by the skill of the surgeon or the physician. Indeed, it is every man's interest to believe a good deal for his own comfort's sake — for any of us may be attacked by almost any disease, or may break our bones or get smashed in the train, or shot, or go blind or deaf — and in looking forward to such-like inconvenient interruptions of life and health, we say it is the greatest comfort to reflect that science cannot only cure all sorts of things, but can almost bring back the dead to life again.

Most of our readers may have perused a story which recently went the round of the papers, about two men who were executed. Their heads were cut off; and then a cunning surgeon was allowed to step forward, pick up one head, clap it on the lifeless trunk which was laid flat on a couch, sew it on tightly, and apply a vigorous current of galvanism to the defunct malefactor. His pulse revived—slowly, of course, — not long afterwards, he winked with one eye, or even both. In some months, this medicated Frankenstein got up, and, to the doctor's terror, began to walk about; but horror of horrors — he had got on the wrong head! — in the hurry and excitement of the moment his own head had dropped aside, and been cleared up with the other body. But where is he now? The account, which professes to be a well-authenticated medical report, forgets to say; but doubtless, by-and-by, we shall hear that Mr. Barnum is in treaty with this live wrong-headed corpse, and we may hope yet to see *him*, or *it*, or *them* (whichever the *head and body* choose to be called), for twenty-five cents apiece. Now, it is a fact that many people read this story gravely — for it was stated with inimitable gravity and detail — and, for aught we know, many people may believe it devoutly at this moment. When Edgar Allan Poe, some years ago, wrote his great mesmeric story, in which a man on the point of death was kept suspended between life and death for some months, and then, the reverse passes being made, suddenly collapsed into the loathsome condition of a corpse many months old; this story

was reprinted in a contemporary daily paper, still in circulation, as a new story, and believed in by thousands. No doubt this kind of credulity bestowed upon medical science, physic, and physicians fills many a fashionable watering-place at home and abroad. Of course, a good many people affect the invalid because they have nothing else to do, and get well under the most elaborate treatment, because there was nothing the matter with them; but we must not shut our eyes to facts, and we cannot deny that the mind exercises an astonishing influence over the body, and that in this way faith and physic together remove mountains of maladies.

Here is a man who suffers from pains in his joints. Of course he must go to Sloshenbad at once, and lie in liquid mud for six hours per diem, and eat nothing but grapes, or drink nothing but milk. It is most extraordinary, but his appetite *does* improve. The fact is, he expected it to improve. He eats with a will, and on principle. The whole thing is novel, and he enters into the novelty with zest. He gives his whole mind to it, and what we give our whole minds to generally succeeds. He goes home: his joints are still stiff and painful. "Oh," says the doctor, "the peculiarity of these baths is that you don't feel the benefit of them until some months after you get back." The months go by; he fancies he really is better; but the pains come on soon after the summer sets in, and then it is time to try another treatment. This time he is recommended the incessant drinking of nasty waters; and so he is off in high spirits to Swillen-Brillen.

Then there comes an autumn, when his friends don't know what to do with him; and the new doctor, who says that Sloshenbad is all humbug, and Swillen-Brillen is rank poison, orders him immediately, as an infallible remedy, to repair to Muckenstadt, whither the groaning patient, still hopeful about himself, is conveyed in all haste, and where, greatly to the relief of himself and his friends, he dies in about a week.

And yet no one can say that he has not had a better time of it abroad than he would have had if he had stayed at home; and certainly no one can affirm that the constant hope of getting well may not have kept him alive longer, as it certainly did materially contribute to his happiness as long as he lived.

We read the other day an account of a gentleman who suffered for years from a swelling in his leg, caused by the kick of a horse. He underwent the "dry earth" treatment (by which it must not be understood that he went under the dry earth, alias got buried, which is, after all, the great remedy)—he applied earth to his legs, that is all. "The treatment," we are informed, "was continued for three weeks, at the end of which time the wound was quite healed." We are no scoffers — we fully believe it; for such cheap cures are of daily occurrence, especially amongst the poor, who cannot afford more expensive and luxurious treatment. No one who has not observed the curative process going on can form any idea of the results to be achieved by peppermint and water. A spider wrapped up in butter is almost omnipotent with poor children, and the most obstinate of adult-diseases have been known to yield at last to incessant doses of "julip!"

Now the moral of all this is, that the power of the human will, and the force of imagination, once realized by the patient himself as well as the doctor, the patient is immediately in possession of the most powerful means of cure. It is not only in self-delusion, it is also in self-knowledge that his strength will lie. Let him intelligently expect the best results from change of air, change of scene, and change of diet, without ignoring the fact that these changes act principally upon the body by refreshing the mind, and inspiring the imagination with new and agreeable sentiments. But lastly, we have no right to affirm, in the face of repeated and constant experience, that certain waters have not certain curative properties, or that certain medicines are not in themselves highly efficacious, although for that very reason their powers have been absurdly overrated.

WOOLLENS AND WORSTEDS.

THE gentleman of to-day clothes himself in a woollen tissue identical in kind with that employed for the Roman imperial robes. It may be that the best of our modern cloth is finer, or it may be not so fine, as the Roman Cæsars used — the last supposition is the more probable; but as to kind, it is the very same, and made — essentials alone regarded — in the very same way.

Variety of names notwithstanding, all woven woollen tissues may be divided into woollen cloth and worsted; and here I would observe that though the designation "cloth" is popularly applied to any woven tissue — of flax, cotton, hemp, as well as of wool — yet commercial people only apply it to cloth manufactured of woollen threads in a peculiar way.

Some of us, perhaps, have heard the remark made, or, perhaps, ourselves made it, that So-and-so was "out at the elbows"; by which is literally meant that the elbow parts of Mr. So-and-so's coat have had the nap worn away to such an extent that the actual threads or yarns of which the garment was woven are visible. In new cloth the threads cannot be seen, a short fur nap hiding them; so when the threads *do* appear it is time for Mr. So-and-so to dispose of his coat as best he can, and put himself in communication with some tailor artist. Perhaps he has a wife, and perhaps his wife has a stuff dress. Very well: even though madam's dress be quite new, one cannot only see its threads, but if inquisitive, and sufficiently endowed with patience, can count the number of them in any given space. Still madam is content; the nature of her material is such that one must, and always does, see the threads — in what, then, is the difference? The better to manifest what woollen is not, let us see what cloth is. Wool is either long or short, and for the cloth manufacture, if wool be not moderately short, it must be shortened artificially. It is next well oiled and spun into thread or yarn, then woven into a tissue that will be cloth by-and-by, though a long way distant from cloth when it leaves the weaver. The tissue, if examined at this stage of manufacture, would display its threads just like madam's stuff gown does. A coat of this material would be threadbare all over, despite its newness. Before this material can become commercial cloth, five chief things will have to be done to it. Its texture must be closed; it must be shrunk, that is to say, it must be cleansed; a nap must be put upon it; superfluous nap must be shorn off; finally, it must be hot-pressed.

First, as to the closing or shrinking. To accomplish this is the fuller's task, and he goes to work as follows: — He takes the material to be shrunk, wets it, soaps it, and submits it to the fulling-mill for a considerable time,—seven or eight hours, — under which operation the shrinkage is effected. Now, bearing in mind the saw-like teeth, and the quality of felting, what happens will easily be understood. The wool fibres are well soaped, and but for their serrations all looking one way, they would slide upon each other in various and irregular directions. Practically, however, they can only slide one way, namely, with their roots foremost. The result is that the saw-like teeth catch amongst each other, at every catch making the wool fibres shorter, whereby the entire texture is shrunk, and, of course, proportionately closed up and thickened. This result being accomplished, the workman clears away the soap, by means of fuller's-earth and water. Being taken from the fuller's mill, the shrunken material has next to be dried. Well, our material, woven, fulled, and dried, is not cloth yet, though a considerable way advanced on its road to cloth. It has no nap, so the next process will consist in imparting a nap to it. This is effected by little hooks incomparably finer than any hooks man's ingenuity has enabled him to devise, the agent used by clothiers of to-day, as by the Romans,

being the hook-like growths of the *Dipsacus fullonum*, or fuller's teasel. This plant, in growth, is something like a thistle, though botanically it differs from a thistle. It bears round heads, each about the size of a small apple, and studded all over with fine hooked protuberances. Many of these teasel-heads being packed together and bound up tight on a flat surface, make a sort of comb or curry-comb, and this was the invariable way of packing teasels for use in cloth manufacture once. They may be also packed on a cylinder, but, however arranged, their use in getting up nap out of threads will be obvious. Caused to rub against the incipient cloth, they scratch out little odds and ends of wool, and produce a hairy surface. The nap just scratched up by the teasel-hooks is of all lengths within certain limits. The manufacturer wants an even length, which he accomplishes by shearing. Next follows hot pressing, which, being done, we may regard the cloth as made.

In this place I only consider it necessary to remark that the dyeing of wool may either be performed whilst it yet is wool, or else subsequent to its conversion into cloth. All highest quality cloth is wool-dyed, as tailors' placards sufficiently inform us.

In this manufacture sketch I have described principles, not details, such being enough for my purpose. Cloth-making, like calico-making, would, if fully gone into, involve a description of much complex machinery.

Having produced our sample of cloth at last, let us pause to consider the advantages it has, in certain respects, over all other woven materials. Neither silk, nor cotton, nor linen, can be felted or shrunk by the fuller's art, wherefore in closeness of texture, cloth — that is to say, woollen cloth — has an advantage over other woven fabrics. This closeness not only enables it to repel wet better than silk, cotton, or linen, but, independently of any power of heat-conduction or non-conduction, aids the preservation of heat. Regarded as a material for taking up dye-stuffs, wool is — all points considered — superior to either silk, cotton, or linen; and here I would observe that, having some particular dye to work with, it by no means follows that I can tinge whatever white woven fabric I like with it. Certain dyes that act well on wool cannot be made to act on any other material.

In this account of cloth I have described it as cloth ought to be, and as the best cloth is; but human genius is an inventive quality, very wonderful in its adaptation of means to ends. Of this, the modern cloth manufacture affords some good illustrations: one just occurs to my mind. Friend "Out-at-elbows" discarded a coat, we remember. What is the usual destiny of such a coat? It will have been sold to one of those artists who profess to make coats "*better ash new.*" First and foremost, the threadbare elbows have to be seen to: what will the artist do? By friction with teasel-heads a new nap could be raised; not so good as the original one, of course, but a nap of some sort. I am told that the more heroic friction of a wire brush is practised by these ingenious artists. The appearance may be satisfactory for a time, but as for the strength of threads thus violently treated, the less we say about that the better. Elbows having been renovated, and grease extracted from the collar, the coat being sponged and "goosed," comes out — professedly *better ash new.* In this condition it is sold to adorn the person of some new master. Well, time, attrition, and the elements work destruction on this renovated coat. Off comes the elbow nap, and probably the attenuated threads giving way, there is a hole. If the coat is to be worn any longer, it must be mended — patched, and we cannot specify any fixed limit to which the patching may be carried. A new and brilliant destiny awaits that coat — the fabled phœnix would be exactly parallel to what will take place, if only the phœnix, instead of burning to ashes, were pulled to pieces by a mill. One has heard some talk about mills to which old people are sent to be ground young again — that is of course a fable; not a fable, but altogether a fact, is the shoddy-mill, through the inge-

nious operation of which old garments of cloth are made young again. Shoddy and mungo are terms commercially given to old cloth and old woollen fabrics that have been torn to pieces by a toothed mill, and brought to such a state that they can be mingled with new wool, spun into yarn, and woven. Devil's dust is the designation popularly applied to both shoddy and mungo.

One would be unreasonable to expect the same amount of wear out of it as out of new wool, but to be able to use it is desirable. Just as old cloth and wool stuff can be torn to pieces in a mill, so can cotton or any other fibre; accordingly, much of the clothing made up by cheap tailors holds cotton amongst it. The disadvantage of cotton in this case is threefold. Not only is it a worse conductor of heat than wool, but it does not shrink on an equality with wool, the consequence of which is that when garments of this mixed material are wetted, they contract unequally in different directions, drawing the clothes up into a number of unseemly puckers. Another disadvantage is, that cloth of such mixed material will not take dye-stuffs so well as cloth of pure wool.

I have already intimated that the word cloth, or more especially broadcloth, is limited to a fabric of short wool, felted or fulled, napped, and the nap shorn. Commercial people limit the term cloth still more to a woven material, the threads of which lie direct crosswise in respect to each other. Thus the woven material called "Kerseymere," for example, will, if examined, be seen to have a slanting set of threads running across its fabric.

Having disposed of cloth, turn we now to the numerous class of fabrics designated by the general term "woollen," but having amongst themselves specific names well-nigh endless. Whatever called, and whatever their varieties, woollens are made up of combed or defetified wool. They have not gone through the fulling-mill, and they are devoid of nap. All these observations apply to what we may call "pure race woollens," as here I should observe that certain stuffs are known to modern commerce in which the characteristics of cloth and woollen mingle. This is effected by the mingling of cloth-wool with woollen-wool, thereby producing a compound fabric susceptible of fulling. We have not forgotten the ingenious method adopted for raising a nap on cloth. A typical woollen fabric, on the contrary, is expected to have no nap at all, the presence of such being a defect. Instead, therefore, of coaxing up a nap on this class of goods, the little they have is burned away by an ingenious process of singeing — done with the same object that one singes a goose, only by a different method.

The old plan adopted was to pass the woven fabric with great rapidity over a red-hot cylinder, for which gas-flames now have been extensively substituted.

The first manufacture of woollen goods in England is first mentioned in the records of the year 500 A. D. Just as well is the fact established that not much progress was effected in this manufacture in Britain until the reign of Henry I., when a vast number of Fleming cloth-workers having been driven out of their own country by an inundation of the sea, established themselves in England. No historical statement approaching this clearness can be found in respect to worsted. The probability is that at different times the two manufactures have intermingled, passing gradually into each other, just as we now find that certain complex stuffs are made half worsted, half woollen. In considering worsted goods, one must not forget such as are knitted, not woven. Knitted caps seem to have been men's general head-wear up to Elizabeth's reign, when felt hats came into vogue. The knitting of stockings in England was not practised until still later, the art having been introduced from Spain. Although sheep's wool has been assumed the sole raw staple of worsted goods, yet the hair of the lama or alpaca, of the Thibet goat, and yet other animals, is woven into fabrics to which the general designation worsted seems equally applicable.

SNAKE-BITES AND THEIR ANTIDOTES.

Part II.

IN the *Englishman* of the 5th August, a very interesting series of experiments, undertaken by Dr. Fayrer, of Calcutta, was published. They seem to have been carried on with the greatest care; and were valuable, both from the variety of antidote which came under consideration, and also from the fact of their being conducted by professional men alone, who were, consequently, well qualified to administer the remedies to the greatest advantage. A fowl was bitten by a cobra (not a fresh one, and which had bitten before). It died in seven minutes, although treated with fifteen drops of strong "Condy's solution," injected by a hypodermic syringe.

A dog was then bitten by a cobra under similar circumstances. In seventeen and a half minutes he fell over. Sixty drops of liq. ammonia, sp. gr. ·959, were injected into the crural vein. No improvement was apparent. Forty drops more were injected after the lapse of ten minutes. In twenty-five minutes the dog was dead.

The external jugular vein of a dog was exposed: forty drops of the liq. potas. permanganate (Condy's) were injected. After thirteen minutes had elapsed he was bitten by a large cobra (not fresh, and which had bitten before, and had been some time in captivity). In one minute the bitten leg was partially paralyzed. In two minutes he lay down. After four minutes, forty more drops of the same fluid were injected: no improvement effected. After twenty-four minutes, forty more drops were administered; still there was no change for the better. In thirty-seven minutes the dog was dead.

A dog's external jugular vein was exposed. Four drops of the poison of a somewhat weakly cobra were injected. One drop may have been lost: the remaining three entered the system. The dog was treated with sixty drops of ammonia, injected into the jugular vein. No amendment ensued, and the dog died in fifty-five minutes.

The jugular vein of a dog was exposed. He was then bitten in the thigh by a fresh cobra. In one minute symptoms of distress were visible. Within six minutes of the infliction of the wound he was treated with a solution of quinine: sixty drops were injected of a strength of one grain in eight drops. No amendment occurred. In eleven minutes the dog was dead.

Equal parts of cobra poison and liq. ammonia, sp. gr. .959, were mixed together, and fifteen drops of the mixed fluid were injected with the hypodermic syringe into a pigeon's thigh. The pigeon died in two minutes. This is very unfavorable to the theory of the antidotal action of liq. ammonia.

Ten drops of fresh cobra poison were injected into the jugular vein of a full-grown dog. Within one minute sixty drops of ammonia were injected; but the action of the poison was so rapid that the dog died almost before the second injection could be completed. In seventy seconds he was dead. This shows the frightful virulence of the poison, when administered, in a large blood-vessel in large quantities. Dr. Fayrer here observes: "How can such a death be explained, except by exhaustion of the nerve centres? Any theory of blood-change is surely totally inapplicable here."

A pariah dog was bitten in the fore-arm by a cobra. A ligature, which had been previously placed loosely above the part bitten, was immediately tightened, and the actual cautery of the wound was performed by a piece of pointed steel heated to red heat. In ten minutes the dog became restless, and staggered. Ammonia was injected into the jugular vein. The symptoms became aggravated, and death ensued in forty-three minutes, in spite of the careful application of the ligature.

A second dog, smaller than the first, was bitten, and received similar treatment, with the exception of the application of ammonia. He died in thirty-

five minutes. The cobra which had already caused the death of the former of these two dogs was made to bite seven fowls and one pigeon, in quick succession. Of these, seven died, and the eighth, though showing symptoms of suffering, eventually recovered. It is curious to notice the gradually diminishing virulence of the poison on each successive occasion. The first fowl died in three minutes, the second in ten, the third in eleven, the fourth (a very large one) in seventeen, the fifth in twenty-two, the pigeon in forty-two, the sixth fowl in forty-nine minutes.

Dr. Fayrer remarks:—"The cobra was neither a very large nor a very vigorous one, and yet how deadly! Eight creatures destroyed by a rapid succession of bites! The experiment proves that the snake becomes weaker by biting, until he becomes exhausted."

Other experiments, bearing less on the main object of this article, were also entered upon. A viper was bitten by a cobra, but no ill effects followed. A cobra was then made to bite itself on the tail,—he also suffered no ill effects. A cobra was bitten by another of the same species, but with similar results.

An attempt was also made to discover if the poison of one kind of snake could be used as the antidote against the power of another species. With this view a cat was bitten by a viper, and a few minutes afterwards by a cobra. The cat died in the usual time, and there was nothing apparent to show that the virulence of the poison was either arrested or stimulated by the variety of poison.

A most exhaustive variety of antidotes were made use of in the course of experiment, yet with what a disastrous result! The deadliness of the poison, and the utter inability of the remedies to cope with it, is clearly demonstrated; and the knowledge thus gained leads one to suppose that the recorded instances of cure are the exception,—when the deadliness of the poison has become exhausted by previous attacks; or when sickness, or want of vigor, may have impaired its power of injury; or, lastly, when the poison penetrates so superficially as not to be absorbed into the inner vessels of the system.

Dr. Fayrer's remarks are so much to the point, that I do not hesitate to insert them.

"My belief is, that if an animal, and probably a man, is fairly bitten by a fresh and really vigorous cobra, or daboia—[I believe this is a kind of viper]—it or he will inevitably succumb, unless some immediate and direct method of arresting the entry of the poison into the circulation be practised. That such may be done I will not deny; but the two experiments just recorded—[referring to the case in which ligature had been employed, and actual cautery inflicted, without success]—performed with the greatest care by two surgeons accustomed to such operations, shows that at least it is very difficult. . . . . . The same may be said of the actual cautery. Unless the hot iron enter the puncture directly after the fang has been withdrawn, the poison is already far on its way towards the centre; and the burning, though it destroys the tissues and such of the poison as may not have entered the circulation, can have no influence upon that which is already beyond its reach. . . . To conceive an antidote, in the true sense of the term, to snake-poison, one must imagine a substance so subtle as to follow, overtake, and neutralize the venom in the blood, or that shall have the power of counteracting and neutralizing the deadly influence it has exerted on the vital forces. Such a substance has still to be found, and our present experience of the action of drugs does not lead to hopeful anticipation that we shall find it."

It was a matter of regret that, while making the experiment of an injection of equal parts of cobra poison and ammonia, that of carbolic acid and the same poison mixed, should have escaped the notice of the experimenters. Suggestions to this effect were ventilated, and a hope was expressed that this phase of the experiment would receive attention at some subsequent

time. It was stated that the effect of a small quantity of carbolic acid, administered internally, was an almost instantaneous death to the cobra. In less than two minutes all self-directed vitality and power of movement is destroyed, and the paralyzed form only writhes in involuntary contortion. In a very short time all motion is suspended, and the snake lies stone dead. It was argued (but, it must be confessed, it is not at all a necessary sequence) that, the effect of the internal application being so decisive, it might have a counteracting effect as an antidote. Though the supposition was supported by no conclusive law of induction, it was hoped that a trial would be made, as in certain quarters considerable confidence was displayed in the antidotal action of this acid; and it was suggested that the point should be settled determinately in a manner similar to that which proved so fatal to the pretensions of ammonia — namely, by its administration in conjunction with the poison by injection. I am not aware that this has ever been attempted; but a trial sufficiently similar was made by Dr. Fayrer, at the instance of these suggestions. The cobra poison was, in the first place, injected into the jugular vein of a dog, and in almost immediate succession one of carbolic acid was applied; but not with any favorable result, or giving evidence of any amelioration or any counter-action to the virus.

If we consider the facts which these recent experiments have demonstrated, we are irresistibly led to the conclusion that a man stands a very poor chance if he have the misfortune to be bitten by any of the more venomous of the family of snakes. With the best professional aid at hand at the moment of occurrence, the chances of escape are almost infinitesimal; and under unfavorable conditions, when a man is by himself, and without a drug on which he can depend, his life is as surely forfeited as if he had hurled himself off the Tarpeian Rock, or tested the theory of gravitation from the dome of St. Paul's. We have every reason to be thankful that snakes are timid, and not naturally aggressive animals, and also that their attacks are, from their formation and the nature of their movements, limited to the lower extremities, which are in a great measure protected either by leather or loose thick cloth: and, thirdly, that their fangs, though so exquisitely keen, are not sufficiently long to penetrate a strong, stout substance, such as the above. A sportsman who never neglects the precaution of being stoutly shod, and equally protected by cloth or leather integuments to the knee, has not much to fear from the ordinary run of snakes. True, there are some venomous types which inhabit trees, and drop on their unwary victims; but I am of opinion that their number is very much overrated, and the localities in which they exist very restricted in limits. The natural love for horrors, which is an invariable weakness among ignorant, superstitious people, multiplies realities a hundred-fold.

A gentleman recounted to me the horrors of a little snake which haunts trees in a certain district of India. A retainer of his had occasion to climb up into a tree, in a small hole of which the little monster had established his *Penates* (household god). In spite of exceeding diminutiveness, he at once attacked the invader with such rapidity and determination that there was no escape for the unhappy man. The results were fearful and immediate: as the thunder follows the flash, so was the cause and effect in rapid sequence. Down the tree the victim fell headlong, and the dull thud which announced that his body had reached the earth was that of a corpse. There is room for presumption that the fall might have had something to do with such a fatal result; but my informant hastened to remove any misapprehension there might have been on this point, by unhesitatingly ascribing the whole catastrophe to the subtle venom, which had completed its work with the speed of electricity. Still, calm reflection has induced me to conclude that his slavish adherence to the law of gravity contributed very powerfully to his calamity.

Undeterred by the shocking example which had been made of one of his domestics, a second was forthwith sent up the tree to capture the reptile, if possible. By an ingenious contrivance the little fiend was snared. A bold man, armed, *retiarius*-fashion, with a net of exceedinly fine meshes and a stick, scaled the tree. Arrived at the hole, he placed the net over the orifice so as to bar all exit, and, by cautious irritation with the stick, incensed him into a second attack. The net received him. Once there he was a hopeless and helpless captive, and became the absolute property of my friend, "Monsieur le Raconteur."

Since writing the above, a curious anecdote of snake-bite has come to my knowledge, which, if true (and I have no reason to believe it otherwise), exhibits most forcibly the fearfully rapid action of snake-poison on certain occasions. A gentleman, walking in his garden with his dogs — a spaniel and a terrier — had his attention attracted by the latter, who, after the manner of his kind, was vehemently engaged in the pursuit of sport among some *debris* and refuse. The spaniel joined his companion, and both became so actively absorbed in their occupation, that their master was induced to give them a little aid by clearing away some matted briar-bush which impeded their investigations. Relieved of this difficulty, they soon scratched a hole, into which they alternately dived, and again retreated as quick as lightning, until on one occasion the spaniel failed to make good his retreat. His master saw a long black form dart out, and withdraw itself as rapidly, while the dog retired with a yelp. The terrier, however, nothing daunted, rushed into the hole, and a moment afterwards reappeared, *with half a cobra in his mouth.* The master, being now for the first time thoroughly aware of the dangerous nature of their antagonist, immediately hurried the dogs off to a small pond of water, at the same time sending a man to the house for ammonia. The spaniel was first examined, being dipped in the water to cleanse him of the mud with which he had begrimed himself. As he was drawn out of the water the power of the poison asserted itself, and *in ten seconds* he was dead: the moment of death being within *one minute and a quarter* of his receiving the bite. The terrier was not bitten. It is difficult to account for the extreme rapidity of the action of the poison, unless we take into consideration that the dog's blood had, by excitement and exertion, been roused into such active circulation that it became a much speedier conductor of the poison to the nerve centres than it would have been had it been in a more sluggish state. In any case it must be accepted as a most striking example of the power of snake-poison, and we could wish for no better to complete our illustrations of its fatal effects.

SURFACE-OCEANIC LIFE. — Those who only know the sea under the aspect which it usually presents round our coasts, will hardly be acquainted with the fact that the surface of the ocean forms a world in itself, inhabited by myriads of strange and delicate creatures, as distinct in its conditions from the shore world, as from the inhabitants of the dark mysterious depths whose oozy plain, shut off from the day by three miles' thickness of water, is tenanted by the lingering and stunted refugees of a world of animals now for the most part extinct. The creatures which inhabit the surface of the ocean, are very many of them born and bred there; others, on the contrary, have left their parents at a very early age, being carried away from the shore by surface currents and drifted out to sea, there to pass through ever-changing forms, until the time comes for their return to shallower places and a life of grovelling on the ground.

GOOD nature is a glow-worm, that sheds light even in the dirtiest places.

KINDNESSES are stowed away in the heart, like bags of lavender in a drawer, and sweeten every object around them.

THE CIRCULATION OF THE BLOOD.

BY ROBERT WHITE, JR., M.D., BOSTON.

Third Paper.

HAVING fully described the construction and action of the heart, the course of the blood through it, and the action of the valves, we will now describe the arteries and veins, the manner in which the blood passes through them, and the duties it performs, from the time it leaves the heart until it returns to it. The arteries and veins carry on the great work commenced at the heart, and in form and arrangement are not unlike the water-pipes which underlie the streets of a city; but in this case there is a second or return set of pipes (the veins) for carrying the fluid back to the central source after it has discharged its office. Like these pipes under our streets, the arteries start from a large central pipe (the aorta), gradually increasing in size as they progress outwards, and giving off innumerable smaller branches for the supply of every portion needing the fluid. The arteries take their name from Greek words signifying "to contain air," as after death they are found empty, and the ancients therefore concluded that they contained air only during life. They are tubes cylindrical in form, and composed of three coats or layers joined closely together, so as to make a strong elastic tube. The outside coat is composed of loose cellular tissue, and serves mainly as a protection to the vessel; the middle coat consists largely of circular muscular fibres, which have an involuntary power of contraction aiding the flow of blood by their compression; and the inner coat is of very fine smooth membrane, which by its character lessens the friction of the blood in its passage, and presents to the fluid the best fitted surface which could be devised for facilitating its passage over it. This is the general form and construction of the arteries, and is the same all over the body, the only difference being in size.

The aorta is the large arterial trunk rising from the left ventricle of the heart, and into which, you will remember, the blood is poured by the contraction of the ventricle. It passes obliquely upwards from the heart for an inch or two, curls over, and then descends on the inside of the spinal column to near its base, where it divides into the large arteries, that in their turn subdivide and supply all the lower portion of the body. Just after leaving the heart it gives off the branches which supply the head, face, and upper extremities, and lower down it sends off very large branches to the lungs, stomach, kidneys, liver, intestines, and spleen; in fact all the organs of the chest and abdomen are supplied by branches directly from the aorta itself. All the arteries of the system either have their origin directly from the aorta, or are subdivisions of arteries which *do* arise from the aorta. The only exception to this is the pulmonary circulation, which is distinct from the general circulation, so you will see that with this exception, that to whatever part of the body the blood finally goes, it must first pass into the aorta, just as the water which is brought into a city comes in first through one large pipe, and is then distributed through the different streets by smaller pipes, and finally to the houses by still smaller branches leading from those under the streets; so the arteries starting from the aorta, and subdividing, branch off into every part of the system needing nutrition, until finally they become so minute as to be visible only with the microscope. The arteries communicate very freely with each other by branches called *anastamoses*, so that if by any chance an obstruction should occur in a vessel, the circulation would be carried on by the blood passing out through a branch above the obstruction into some neighboring artery going to the same point as the obstructed vessel, and thus the circulation of the part would not be interrupted. Owing to disease in their walls, the surgeon is occasionally obliged to tie an artery, thus completel-

obliterating its channel; and if some provision of this kind did not exist, the circulation would be completely suppressed, and the part deprived of blood would perish. Most of the arteries are very well protected from external injury by being situated deep in the tissues, covered with muscles, etc., and at the joints are nicely imbedded and covered in cushions of loose fat, so that the bending of the limb cannot injure them. In the knee and shoulder, for example, they run *under* the joint, and thus are not near as much exposed to injury as if passing over it.

The blood passes through the arteries in a full, rapid stream, distending them to their fullest capacity; this stream is continuous, as before the aorta is emptied of the blood poured into it by one contraction of the heart, it is filled again by another contraction, but at every contraction the column of blood receives an "impulse" which is transmitted through the whole arterial system, distending the elastic walls of the vessel, and by its force partially lifting the artery from its bed, and causing it to strike against the tissue covering it. (See Plate 5—Second Paper.)

Place your finger over any of the arteries where they approach the skin, as in the temple, wrist or ankle, and you can distinctly feel this impulse, which is the "pulse" that the physician wishes to feel when he places a finger on the wrist or temple of a patient. Of course the beating of an artery in any part of the body indicates the state of the circulation, and the physician only selects these as the most convenient places for examination. (The subject of the pulse was spoken of fully in the second paper.)

The strong impulse which the blood receives from the contraction of the left ventricle, sends it forwards through the arteries, and united with the muscular contraction and elasticity of their coats, and the favorable state of the smooth internal coat, insures its passage onwards until it reaches the capillaries.

The Capillaries.

These are a set of small vessels forming a network between the terminations of the arteries and the veins, and through this network the blood passes from one set of vessels to the other. They are about *one three thousandth* (1-3,000) of an inch in diameter, and therefore can be seen only with the microscope; and even with its assistance it is difficult to define their exact limits, their connection with the arteries and veins is so close; but they are placed between the fine extremities of the two vessels as a means of communication between them, and the blood passing from the terminal branches of the arteries, passes through the capillary tubes to reach the veins. They are very numerous, sometimes amounting to several hundred in a square inch of surface.

The Veins.

The veins are the return pipes which carry the blood back to the heart after it has discharged its office. The blood flows through the arteries *from* the heart, but through the veins it flows *towards* the heart, so that, properly speaking, the veins *begin* at the extremities of the body where the arteries *end*. Plate 6, with this paper, will help to illustrate this subject. It is only a diagram intended to convey an idea of the difference between the arterial and venous circulations. You will see that the veins begin at the termination of the arteries, and that the capillaries are interposed between them. The vessels which form the origin of the veins are as fine as the branches in which the arteries end; a number of these fine branches unite, forming a larger vessel, which soon meets another, unites with it, and thus they keep on increasing in calibre as they approach the main trunk. The veins have the same number of coats as the arteries, but they are very much thinner and less elastic, and there is but very little, if any, muscular fibre in the middle coat. The inner coat is not unlike that of the arteries, and answers the same purpose. The veins are more numerous than the arteries, and their united capacity is considerably greater. The large arteries and veins generally lie close to each other, and are some-

Plate 6.

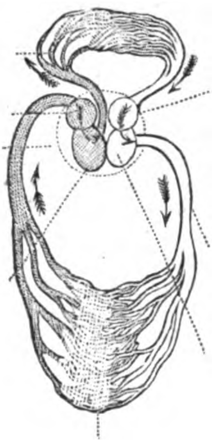


Diagram representing difference between arterial and venous circulations. The left, or light side, represents the red, arterial blood passing through the arteries from the left side of the heart. The right, or dark side, shows the dark venous blood returning to right side of heart, and the commencement of the veins at the termination of the arteries with the capillaries between.

times enclosed together in a thin sheath; occasionally two veins will accompany a single artery. But few of the veins which are seen through the skin have arteries accompanying them, these vessels returning the blood from the skin and superficial tissues only, and they empty themselves into some of the deeper veins. The veins of the head and upper extremities all unite in a large vessel called the *superior vena cava*, and those from the lower part of the body end in a similar vessel, called the *inferior* vena cava, both of which empty into the right auricle of the heart. The *venæ cavæ* correspond to the aorta, bringing back to the heart the blood carried out by the aorta, and thus the circuit is completed. It is then sent to the lungs through the pulmonary artery, purified, returned to left side of heart, and sent through the aorta again.

The Valves of the Veins, and their Relation to the Column of Blood.

The course of the blood through the veins is very much slower than when passing through the arteries, and its movement is not attended with any motion or pulsation perceptible outside the vessel, as the impulse it received from the heart's contraction has been expended in its course through the arteries and capillaries, and the blood is forced to pass onwards through the veins towards the right side of the heart, by the pressure of the column of blood in the arteries and capillaries behind which is always flowing onward, and its movement through the veins is aided by the power of "aspiration," which the heart possesses in the dilatation of the right auricle after it has been emptied, as when this chamber expands it sucks the blood in from the large veins opening into it, operating just like the bulb of one of those rubber syringes that are filled by squeezing the bulb in the hand, immersing it, and allowing it to expand, when it draws the water up and fills itself; and this is just the action performed by the right auricle in drawing the blood onwards from the veins. There is another provision for insuring the onward progress of the blood, a very simple, yet effectual one, similar to that existing in the heart to keep the blood in its proper course there, namely:

Valves.

These are of the simplest form, being merely a little flap of membrane on each side of the vein. The arteries possess none of these, and they are not needed there on account of the force with which the current of blood is propelled through them; but in the veins, in many cases the column of blood would be likely to fall back by its own weight, or when any obstruction occurred. These little flaps of membrane lie quietly along the side of the vessel pointing in the direction in which the blood naturally flows, and oppose no obstacle to its onward progress; but any movement of the fluid backwards forces the valves down into the centre of the vessel, and they effectually check its movement in that direction, but are readily opened again by the forward movement of the blood.—See Plate 7.

Plate. 7.

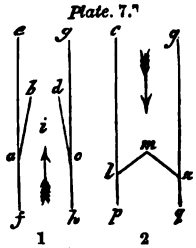


Diagram showing effect of current of blood on the valves of the veins. Plan 1, valves open; e, g, f, h, walls of vein; a-o, attachment of valves to the walls of vein; b-d, free ends of valves, with current of blood, i, passing between. Plan 2, c, g, p, q, walls of vein; l-n, attachment of valves; m, valves closed together by the retreating current of blood. The arrows indicate the course of the current.

The necessity for these valves will be seen in the facts that the column of blood has lost the impulse derived from the heart's contraction, which sent it forcibly through the arteries; the absence of muscular fibre in the coats of the veins to compress the fluid and force it along, and the fact that in all the veins of the lower part of the body the column of blood is obliged to move upwards towards the heart against the force of gravity. The pressure and movements of the muscles surrounding the veins help to force the blood onwards, although if it were not for the provision existing in the valves, this pressure would send the blood backwards as well as forwards. After death the veins are found collapsed, on account of the thinness of their walls, while the arteries retain their form almost intact.

Office of the Circulation.

It may be asked, what is the use of this system of vessels, arteries, veins and capillaries, that has been described? What is the object gained by the wonderful and complicated movements of the heart, and of what benefit to the body are its chambers and its valves? And, finally, What is the blood? This I will try to explain, and will answer the last question first.

The Blood.

The blood is known to most people only as a thick red fluid, which flows from a wound or other injury, and the sight of it excites very unpleasant sensations in many individuals. That "blood is thicker than water," is really true, and if you could see a drop under the microscope, and could test it chemically, you would find that it was a very complicated mixture. As we find it in the arteries, blood is composed of more than a dozen different constituents. Like all the other fluids of the body, its great bulk consists of water,—the proportion being about 900 parts of water in each 1,000 parts of blood. In this 900 parts of water is dissolved some 9 parts of the different salts of sodium, potassium, lime, and magnesia, and the balance consists principally of the substances known as albumen and fibrine, with some fat. These are all suspended or dissolved in the water of the blood, and form about one-half of the whole bulk of the fluid, and this mixture is called the *plasma*. But all these materials named form a nearly colorless solution,—the color and consistence of the blood being given to it by the "blood globules," which are little discs about 1-3,000 of an inch, or less, in diameter, which float in the *plasma*, and are composed of nearly similar materials to the *plasma*, with the addition of red coloring-matter which contains iron. It is the large number of these globules present in the blood that

give it its red color. They form nearly one-half of the whole bulk of the fluid; and when a drop of blood is placed under the microscope, they are seen lying together in little piles, like rolls of coin. In sickness these blood globules are greatly diminished in number, and this is the cause of the paleness so familiar in long illnesses.

How Nutrition is carried on.

All these materials which have been named as present in the *plasma* of the blood, and in the globules, are the substances from which our bodies are built up and renewed. The bones, muscles, brain, nerves, heart, lungs, stomach, skin, and indeed every portion of the body, are made up of this same albumen, fibrine, fat, soda, lime, potash, magnesia, and water, that we find in the blood. How do they get into the blood? They are all contained in the food which we eat, which, after being completely dissolved in the stomach and rendered fit for mixture with the blood, is poured into the large veins near the heart, and each of the different materials finds its place in the portion of blood to which it belongs. For example, we eat a piece of meat and a slice of bread and butter. These contain albumen, fibrine, fat, lime, soda, and potash; in short, all the ingredients of which our bodies are composed. This food is digested, and a few hours after we find it in the blood with its different constituent parts in their appropriate place. You will remember that the arteries and capillaries through which the blood flows permeate every part of the tissues, and those tissues appropriate the proper elements from the blood as it passes through them in the capillaries. The more a part is exercised, the more plentiful is the supply of arteries and capillaries in that part, and the greater is the amount of nutritive principles sent to that part; and, consequently, its growth is much greater. Witness the arm of a blacksmith or boatman, the neck of a porter who carries loads on his head, and the leg of a pedestrian or ballet-dancer. In every process of this kind, of course there is a *waste* or refuse material produced, which it is the office of the veins to remove with the blood, which, by the time it reaches them, is deteriorated by constantly giving off its vivifying properties, and receiving the waste products. The veins take no direct part in the nutrition of the body, but simply carry off the impure blood to the lungs, to be purified and fitted for going through the system again. There are other means of eliminating impurities from the blood, in addition to the lungs, viz., by the skin and kidneys; but as these are separate functions, and require extended explanation for the perfect understanding of them, I merely notice them in passing.

Difference between Arterial and Venous Circulation.

The blood contained in the arteries is of a bright vivid red color, strongly charged with oxygen, and with the elements necessary for maintaining the body in health; while that in the veins is bluish and dark, heavily loaded with carbonic acid gas, and the products of the constant wasting of the tissues is poisonous, and goes to the lungs to get rid of this. When a blood-vessel is cut, a glance at the wound tells whether an artery or vein is severed, the blood issuing in quick, intermittent jets, corresponding to each beat of the heart, and is thrown some distance from the wound if it comes from an artery. If from a vein, it flows in a full, steady stream, welling up freely from the wounded vessel, and is not thrown in jets or spurts. In each case the appearance presented, corresponds to the motion of the stream in the respective vessels. Arteries are not as liable to injury as veins, on account of the superior strength of their coats, and their deeper situation in the tissues. A smart blow on the outside of the skin will rupture some of the superficial veins, and the dark venous blood escaping into the tissues under the skin produces the *ecchymosis*, or "black and blue" appearance, so familiar to every one.

Conclusion.

This, then, is the office of the circulation — to carry the nutritive elements

contained in the food we eat, after it is prepared in the stomach, first to the lungs to be purified, and then to all the tissues of the body, building them up and renewing them; and then carrying off the waste produced by the wear and tear of the system.

I am aware that the description I have given is but an imperfect one, but it is impossible to give a thorough explanation unless the reader is versed in Anatomy and Physiology; and, as a general description, is the only one that can be given in a journal suited for the reading of all; if the reader can gain a knowledge of the main principles governing this great function, the object of these papers will be attained.

THE EYESIGHT AND THE MICROSCOPE.

I HAVE lately heard of several cases of persons purchasing microscopes, and soon becoming afraid to use them, lest they should permanently injure their sight. Now, if the instruments they used were of even moderate merit, the fault of not seeing objects comfortably lay entirely with themselves. It often happens that a beginner with a microscope operates chiefly with transparent objects, and floods the field with excess of light. Any of the paraffin lamps in ordinary use for microscopical purposes, or such excellent oil lamps as those which Mr. Pillischer supplies, give an immense deal more light than is wanted to exhibit any ordinary objects properly, either by transmitted or reflected illumination, and when this light is concentrated by a bull's-eye, and reflected by the stage mirror in full blaze, it is by no means wonderful that the eye is speedily fatigued. A few objects may be advantageously shown under brilliant illumination, for the display of remarkable beauty in the variety of colors they present. The wing case of the diamond beetle and iridiscent minerals belong to this class, and they should be viewed as we look at flashing fireworks, or the lustre of jewels, for a brief space only, and not in a prolonged stare. As soon as it is desired to make out details of their structure, the light should be reduced to a moderate pitch.

There are microscopic difficulties which involve prolonged effort to decipher obscure markings, or indications, with which beginners should have nothing to do, and which experienced microscopists must cautiously deal with if they value their own natural optical apparatus. Men who will sit up night after night, poring for hours over vexatious diatoms, have no right to complain of the microscope if they experience a deterioration of vision. Had they spent the same time in attempting to read very small print in a strong blaze, they would have been equally successful in wearying their visual organs. Such practices are an abuse of the eye, to which, no doubt, a penalty is attached.

The perfection of microscope work consists in its imitation of natural vision. The instrument should extend the range of action of the eye upon small objects; but should not — except for brief purposes of display — materially alter its character. Now, the first thing to be attended to is to keep both eyes open, whether the microscope be used for single or binocular vision. It is unnatural for two-eyed people to shut one eye, and then make a prolonged observation. There are occasions on which it is very desirable to shut one eye for a few moments, as in taking an accurate aim with a rifle, but with the microscope, or telescope, all that is necessary is to acquire the habit of paying attention to the impressions made upon the eye which looks through the instrument, and to disregard what the other may see. Some people have no difficulty in so doing, while others can only succeed if assisted by a little contrivance which many observers have long employed. I mean a shade covered with black cotton velvet, of which several forms have been devised. The simplest, which I have used for many years, is

made of a piece of thin cardboard about as big as a small quarto page, covered with black cotton velvet, and pierced with a hole through which the tube of the microscope, just below the eye-piece, is introduced. I have found that every one upon whom I have experimented, and who felt it difficult to keep both eyes open, and only *look* with one, could easily accomplish it by this means. There is no doubt that the eyes suffer considerably from the common practice of closing one, while looking through a microscope, or telescope, for any length of time, with the other, and it is, therefore, well worth while to acquire the more prudent habit I have described.

The next point to be considered is the method of modifying the light, and diffusing it agreeably through the field. When artificial light is employed to show transparent objects, it is rarely advisable to throw it as it comes from the lamp, or the bull's-eye, direct upon the object. For low powers and large objects, the best contrivance I know is one which Mr. Browning made by my direction a few years ago. It consists of two discs of glass, ground on one side only. The two ground sides are placed in contact, and the edges cemented, to keep them in position and exclude dust. A freshly ground surface of good glass is remarkably pleasant to the eye; the cool dead white appearance it gives to transmitted light is very agreeable, but its performance is deteriorated by handling the ground surface, or by impact of dust. To keep the surface in a fresh state I adopted the method just described, which works excellently with 4-inch, 3-inch, 2-inch, and 1½-inch powers. For two-thirds and half-inch powers, and smaller objects, I take an ordinary slide, and place in the middle of it, on one side, a piece of white foreign post paper, as wide as the slide, and about an inch long, saturated with spermaceti, and covered with a piece of thin glass, to keep it clean. A few thin chips of spermaceti are placed upon the paper, and melted into it over a lamp. When this spermaceti-paper slide is employed, the side bearing the paper is turned *downwards*, and the slide carrying the object placed on the uppermost side. By this means the texture of the paper is kept out of focus.

It is much more common for persons to injure their sight by the misuse of transmitted light with transparent objects, than for them to experience inconvenience from any excess of reflected illumination; and this results, not so much from any greater facility in the exhibition of objects by the last-named method, as from its being one less frequently employed in conjunction with lamps. The reflected illumination obtainable in open daylight, out of the direct sun, is never too strong, and is well adapted to objects of considerable size. To see smaller opaque objects clearly and comfortably several contrivances are advantageous. Lieberkuhns have lately been neglected by many observers to an unreasonable extent. For low powers, a silver-side reflector, mounted on a brass stand with universal motions, is extremely handy.

No microscopist should be satisfied without acquiring skill in the various methods of illumination; and where objects admit of being seen in a variety of ways, all should be tried, as each will bring out some special feature. While an object is indistinct, the observer should avoid paying much attention to it. He should simply watch the changes he can effect in attempts to show it properly, and reserve steady examination until all the adjustments are in order. Few persons are aware how much the eye is under control of the mental faculty of attention, and what advantages they may gain by acquiring the habits recommended in the preceding remarks. — *H. J. Slack, F. G. S., R. M. S., in Student.*

Hospitals. — "Do not build for a long futurity. Buildings for the reception of the sick become permeated with organic impurities, and it is a real sanitary advantage that they should be pulled down and entirely rebuilt on a fresh site periodically."

COCOA.

THERE is probably no article of diet with regard to the origin of which there is so much confusion in the popular mind as that forming the subject of our present article. Cocoa nuts and cocoa nibs, cocoa nut milk and cocoa oil, are all believed to be derived from one common source. This confusion arises principally from the circumstance, that the name of the substance which we use as a beverage should really be spelt *cacao*, and is as totally distinct a term, when so written, from cocoa, as the two plants thus confused are, from each other. The cocoa nuts, so greedily devoured in our childhood, *au naturel* or in the form of cocoa nut rock, are the produce of the cocoa palm, or *cocos nucifera;* while, on the other hand, the cocoa which we boil for breakfast is the seed of the *cacao theobroma*, a dwarfish, although pretty tree, and very different from the gigantic palm already mentioned. The *cacao theobroma* is found chiefly in South America and in the West Indies, but is also cultivated to some extent in the Isle of France, its principal commercial varieties being those of Trinidad, Guayaquil, and Bahia. It bears a fruit not unlike a melon, in the soft rose-colored substance of which the cocoa seeds are imbedded. The seeds themselves are about the size of a large almond, but somewhat thicker, and not so regular in shape. Those from the two first mentioned districts are covered with a brown and bitter husk, enclosing a somewhat pasty and deep-colored mass, which constitutes the useful portion; while the seeds from Bahia, on the other hand, are smaller, lighter in color, and have in the interior a tinge of greenish brown. The number of seeds in the cacao fruit varies according to the districts in which the tree is cultivated. When ripe, the fruit changes from green to yellow, and it is then gathered and opened; and the seeds, having been taken out, are dried in the sun, or are subjected to a slight fermentation, by burying them in the earth before being dried.

Cocoa is manufactured for domestic use in various ways: — 1. The seeds are very gently roasted till the flavor is well brought out, and, after being winnowed from the husks, are broken into little pieces. In this form they are known as cocoa nibs. 2. The seeds, having been roasted, are ground between hot rollers into a paste, and, after due admixture with starch and sugar, the paste is either desiccated and reduced to powder, — in which case it is called "soluble," "homœopathic," "digestive," or any other attractive name — or it is dried in masses, forming flake and rock cocoas. 3. The roasted and winnowed seeds are ground to paste, sugar and seasonings added, and cast into moulds, in which form they are called chocolate. Dr. Johnston states that the separated husks are largely imported into England, under the name of "miserable," and used for adulterating common cocoas, to form a cheap and agreeable beverage for the poorer classes! The composition of cocoa is shown by the following analysis by Mitscherlich:

Theobromine,	1.20
Cacao Red,	3.50
Cacao Butter,	49.00
Gluten,	15.00
Starch,	16.00
Sugar,	0.60
Cellulose,	5.60
Ash,	3.50
Moisture,	5.60
	100.00

It will be noticed that cocoa possesses, like tea and coffee, an active nitrogenous principle called *theobromine.* This principle resembles theine or caffeine, inasmuch as it is also white, crystalline, and bitter; but it contains more nitrogen even than these substances, and is consequently more active. All that has been said about the sustaining and other properties of theine and caffeine, in our tea and coffee articles, may be considered as

applying also to *theobromine*. Cocoa likewise contains a volatile oil, similar to that of coffee; but it differs from coffee in possessing in a high degree fat and gluten, both of which tend to increase its nourishing properties. The fat, commonly called cocoa butter, may be extracted from the seeds by reducing them to a pulp, and squeezing them between two heated metallic plates, when the fat melts and is pressed out. It is of the consistence of suet, white, and semi-transparent, and melts at 86 degrees Fah. It is principally stearin, with a little olein, and has a peculiarly agreeable taste and odor.

From all this it is evident that cocoa is an exceedingly nourishing, but, at the same time, a very rich article of food. Dr. Johnston, with good reason, compares it to milk, as follows:

	Cocoa.	Milk (dried).
Fat or butter,	51	24
Casein or gluten,	21	35
Sugar or starch,	22	37
Ash,	4	4
Theobromine,	2	0
	100	100

But cocoa being richer in fat than milk, and, consequently, more indigestible, some sanitary authorities are prepared to approve of its dilution, by means of starch and other such substances.

This is, however, sometimes pushed to an extreme extent, and Dr. Normandy says: "Unfortunately, however, many of the preparations of the cocoa nut sold under the names of chocolate, of cocoa flakes, and of chocolate powder, consist of a most disgusting mixture of bad or musty cocoa nuts, with their shells, coarse sugar of the very lowest quality, ground with potato starch, old sea biscuits, coarse branny flour, animal fat (generally tallow, or even the sediment of melted tallow). I have known cocoa powder made of potato starch, moistened with a decoction of cocoa nut shells, and sweetened with molasses; and chocolate made of the same materials, with the additions of tallow and ochre. I have also met with chocolate in which brick-dust or red ochre had been introduced to the extent of 12 per cent.; another sample contained 22 per cent. of peroxide of iron, the rest being starch, cocoa nuts, with their shells and tallow. Messrs. Jules Garnier and Harel assert that cinnibar and red lead have been found in certain samples of chocolate, and that serious accidents had been caused by that diabolical adulteration. Genuine chocolate is of a dark brown color; that which has been adulterated is generally redder, though this brighter hue is sometimes given to excellent chocolate, especially in Spain, by means of a little annato. This addition is unobjectionable provided the annato is pure, which, however, is not always the case." Out of sixty-eight samples examined by the *Lancet* commission (England), thirty-nine were found to contain ferruginous earths.

Let us see how far this dreadful programme is in reality carried out nowadays, by glancing at the following results of our analysis. But before doing so, we will explain the simple process we have adopted for obtaining our results. The mode of procedure does not pretend to absolute accuracy to a fraction, but will be found in practice easily performed and understood. It is as follows:—

1. Twenty grains of the cocoa are weighed out and dried for some hours at a steam heat. The dry cocoa is then weighed, and the loss of weight, multiplied by 5, gives the moisture.

2. The residue (from 1) is digested for two hours, with frequent agitation, in four ounces of ether, and the latter having been poured off as closely as possible, the cocoa is again dried, weighed, and the loss of weight ascertained and calculated as above. The loss equals fatty matters.

3. The residue (from 2) is digested for six hours in ten ounces of cold water, and again dried and weighed as before. This loss represents sugar, theobromine, and other soluble constituents; and it is evident that, if sugar of adulteration be present, the loss of weight will be greatly increased.

4. The residue (from 3) is boiled for an hour in ten ounces of water, to

which half an ounce of hydrochloric acid has been added, and once more dried and weighed. The loss in this case consists of starch, cocoa red, etc., and here the starch which has been purposely added is discovered.

5. A few grains of the cocoa are burned on a crucible lid, and the color of the ash is observed. If this be decidedly red, then ochre or some such coloring matter has been employed.

As we have already remarked, although the process cannot pretend to absolute truth, yet a very close approximation can be thus obtained, especially if samples of pure cocoa be first treated in an exactly similar manner. This we have done, and the following results represent an average of several such experiments:—

Moisture,	4.5
Soluble in ether (fat),	48.5
Soluble in water (sugar, etc.),	11.8
Soluble in acid (starch, etc.),	18.8
Residue insoluble (cellulose, etc.),	16.4
	100.0

The color of the ash was a light gray, and no foreign starch was visible under the microscope. Of thirty-one samples of cocoa analyzed, *only one* answered to the analyses of pure, decorticated cocoa; two, however, might be regarded as good samples, and two as specimens of pure cocoa deprived of its oil, and one to which desiccated milk had been added, thereby slightly increasing the fat and sugar. Four samples showed not only that the quantity of real cocoa had been reduced to the lowest minimum, but that ochre or some such ferruginous earth had been added for coloring. On the whole, the picture is one not calculated to reassure the cocoa consuming portion of the public.

Now we are brought face to face with the question: Ought this addition of starch and sugar to cocoa to be regarded as an adulteration? If, on the one hand, we take the word adulteration to mean the mixing of anything hurtful or deleterious with an article of food, the answer must be in the negative, because not only is the starch harmless, but it supplies a want in the article itself, besides diluting its rich and somewhat dyspeptic qualities. Indeed, this admixture has been regarded by an eminent food authority as "a skilful chemical adjustment, made without chemical knowledge, as the result of long and wide experience." But, on the other hand, if we take adulteration to mean the mixing of anything (even if it should be beneficial) with an article of diet, without distinctly setting forth the fact, the present style of cocoa manufacture becomes a sophistication. With the greatest desire to let this matter down gently, as we have no wish to hold almost all the cocoa manufacturers up to public reprobation as sophisticators, we cannot escape the fact that many *prepared* cocoas are advertised as "genuine," nor can we help harboring a shrewd doubt that the comparative prices of cocoa and starch had much more to do with the "skilful chemical adjustment," than a real desire to benefit the public. We should advise the many respectable firms engaged in the cocoa trade to call their cocoas plainly and distinctly *prepared cocoas*, or by some such term as would convey the true impression of their nature. This would be very much more sensible than denominating them "genuine," "soluble," or "homœopathic," etc., when all the connection they have with solubility simply consists in the amount of soluble matter added as a diluent, and with homœopathy in the small amount of real cocoa which they give at a dose.

We now proceed to the consideration of the facilities afforded by the microscope for the detection of adulteration of cocoa, those offered by chemistry having been already shown. On examining a seed of cacao theobroma, we notice that it consists, like all seeds, of an outer membrane, or husk, enclosing the useful portion of the seed itself. This latter is covered by a thin skin, penetrating into its substance, and dividing it into irregular portions, called lobes. In carefully prepared cocoa, entirely deprived of its husk, we have, therefore, only to look for the structures exhibited by the lobes, with their

covering, and also those of the embryo, which exists in one portion of seed, so imbedded as not to be separable in the process of decortication. It thus follows that, under the microscope, we may meet with three distinct structures in good cocoa, and these we will notice *seriatim.*

1. *The Structure of the Thin Membrane.*— This will be observed to consist of a mass of angular cells, filled with oil, and much resembling the similar cells in genuine coffee. This membrane is usually of a brilliant dark golden color, and the edges of the cells appear to stand out somewhat from the rest of the structure.

2. *The Structure of the Lobes.*— These consist entirely of ovate cells, filled with innumerable starch granules. The starch corpuscles are very small, and generally rounded, but no distinctive markings can be seen upon them, except by the highe stpowers of a very fine instrument; and even then, it is only on some of the granules that a spot or *hilum* can be observed. These cells of starch are also somewhat colored.

3. *The Structure of the Embryo.*— This consists of broken and irregular tissues of cells, but which have a characteristic appearance. They are usually of a more delicate color than the other structures, and frequently exhibit a most beautiful pink tint.

The most abundant of all these forms are the starch cells; but all of them ought to be present in a good sample. The chief use to which the microscope can be applied, besides that of proving the existence or otherwise of cocoa in the sample, as above described, is the detection of starch which has been added as an adulteration. It will be observed that the starch granules of other substances are very much larger than those of cocoa, and at the same time exceedingly characteristic in shape.

To examine any sample of cocoa, it is only necessary to mount a few grains on a glass slide, with water, in the usual way, and look at it with a ¼-inch power and "A" eye-piece. Masses of red coloring matter, such as ochre, etc., can be easily detected by the microscope; but for the detection of sugar, it is best to employ the process of solution already described. Half an ounce of good cocoa, stirred up in a pint of water, allowed to settle, collected on a piece of blotting paper, dried at a low heat, and weighed, should not lose more than 50 grains at the very most.

We cannot leave this subject without a word in favor of the excellent idea lately introduced, namely: that of selling pure cocoa very finely ground, and deprived to a considerable extent of its oil. As we have already pointed out, the richness of cocoa was a bar to its use by dyspeptic persons, and had thus led to some authorities even approving of the "skilful chemical adjustment," or in plainer language, the "diluting and adulterating it with starch and sugar." But we most decidedly hold that this admixture is not a chemical adjustment at all, as it is simply replacing one carbonaceous matter by another, and, by so doing, diluting the whole substance, and thus materially reducing the percentage of the important nitrogenous constituents of the cocoa. The most sensible way is undoubtedly to express a portion of the fat, and thus to leave an article in which all the remaining constituents are not only retained, but their percentage increased in a high degree. We would therefore counsel our readers to prefer, in every case, a cocoa thus prepared; as, if an increased proportion of fat is desirable, it can be easily attained by making their beverage with milk, instead of water. We have already given a comparison, on Dr. Johnston's authority, of cocoa and milk, which we now repeat, with the addition of a column for cocoa, prepared in this manner:—

	Cocoa Nibs.	Dried Milk.	Cocoa Essence.
Fat, ...	51	24	25¼
Casein, . . .	21	35	31¾
Sugar and starch,	22	37	33¾
Ash, ...	4	4	6
Theobromine, .	2	0	3

So we thus see that the analogy to milk is rendered much more perfect by the process of fat extraction.

NEW BREAD.

WHY is it that we must refrain from eating new bread, as if it were poison; unless, indeed, one happens to possess the stomach of an ostrich and the constitution of a rhinoceros?

Every one knows how palatable is the steaming loaf fresh from the bakehouse, and we can all remember with what eager eyes we regarded as schoolboys the new loaf, as it stood in its unshapely modesty, wreathed in vapor, in the cupboard. Which of us, during his melancholy days of satchel and Latin-root-hood, has not eyed the forbidden morsel with an eager craving out of all proportion to its merits? — a craving which seemed to develop and increase as our loved and venerated mother assured us that new bread was decidedly unwholesome for little boys. And when a crummy slice from a two days' old loaf was placed in our unwilling hands, smeared and diagramed as it usually was with molasses or other saccharine decoy, and we were told how good it was for us, — but for the molasses, how odious it seemed! Probably this repugnance was strengthened when we recollected how many other unpalatable circumstances were daily happening, — all for our good. We were hurried to bed at the most objectionable hours; we were reminded in the morning of the sluggard, his complaining voice, and his unhappy end; we were soaped, scrubbed, bolused, and birched, — all for our good; so that, schoolboy-like, we sometimes longed to make a surreptitious trial of the bad, by way of a change. Nevertheless, as a rule, our watchful parents and maiden aunts almost invariably succeeded in defeating our cunningly contrived schemes, especially those having for their object the consumption of new bread.

Now, why is new bread unwholesome, or rather, how does it happen that its alleged unwholesomeness is only experienced here and in England? In Paris or Vienna, even the most dyspeptic eat, with a feeling of perfect safety, the exquisite new bread, which is usually baked three times a day and served fresh with each meal. So far from the cry being raised, "Waiter, some stale bread," the *garcon* who dared, either accidentally, through hygienic belief, or from motives of economy, to fetch yesterday's rolls, would have to run the denunciatory gauntlet of the table, and make certain of retiring copperless at the hands of the diners, even if no worse fate overtook him. Can it be that our climate is inimical to the production of bread in the highest state of perfection — that our flour is inferior to, or our bakers less skilful than theirs? Something is evidently wrong, so it may be interesting to look into the chemistry of bread-making here, previously to describing how they manage the production of the staff of life in the south of sunny Spain.

When wheat is ground and sifted, it gets divided into bran and flour. The bran is the outer coating of the grain, which resists the crushing of the millstones longer than the interior, but when reduced sufficiently to pass through the sieves, so darkens the color of the whole as to render it inferior in market value, although really superior in nutritive qualities to the white flower alone. For the former reason it is generally sifted out, and sold for fattening farm stock. The flour consists of the interior. If pure flour be mingled with a sufficiency of water to moisten it, a little yeast and salt added, and the mass kneaded thoroughly together, then placed in a warm atmosphere, it ferments and increases in bulk. Carbonic acid gas is disengaged in the substance of the dough, which speedily becomes cellular. Placed in a hot oven, the swelling increases until the mass has nearly reached 212° Fahr., when fermentation is arrested, the bread retaining the shape it has then assumed. This fermentation is the result of the chemical action which yeast exercises upon moist flour, in changing a portion of the starch into sugar, and then con-

verting the latter into alcohol and carbonic acid. The dough being glutinous and highly elastic, the gas cannot escape, so the mass swells and increases until, the heat killing the yeast plant, further evolution of gas ceases, while the alcohol evaporates and is lost in the oven.

But flour contains other nitrogenous substances than gluten, and others non-nitrogenized, besides sugar. Such substances readily undergo transformation, acting in turn as ferments, converting the starch into dextrine and sugar, and occasionally into lactic acid. When dry flour has been, through any accident or carelessness, exposed to heat and moisture, the albumen it contains passes into this peculiar condition, and is incapable of yielding good bread; because, during the manufacture, the conversion of starch into dextrine and sugar, which always happens in a limited degree, then occurs on a large scale. The bread produced is sure to be saccharine and sodden, being destitute of lightness, porosity, or cellular division; besides having acquired a dark and objectionable color, owing to the presence of diastase, should there have been a slight admixture of bran. In order to counteract the injurious action of diastase, alum is sometimes employed, which enables bakers who are unscrupulous to use many qualities of inferior flour, which, they excuse themselves by saying, would otherwise be wasted.

The dyspepsia so frequently complained of after eating some descriptions of bread, whether new or old, may easily be accounted for. A gentleman, who was in the habit of visiting a certain town, found himself invariably seized with pain in the stomach whenever he took his meals there. Suspecting the bread, he caused an analysis to be made, when sulphate of lime was detected in considerable quantity. The baker asserted his innocence; but a search of the miller's premises revealed a large quantity of plaster of Paris.

Without entering on the discussion of the question as to what the effects of the habitual use of alumed bread on the digestive organs may be, it is sufficient for our present purpose to note the fact that, as a rule, our bread has too much yeast introduced into it, undergoes too little kneading, and that, by the aid of a mineral substance, inferior, or even damaged flour, may be made to do duty in bread-making as if it had been sound, and of prime quality.

About six miles from Seville, is situated the pretty and highly picturesque village of Alcalâ de Guadaira, which supplies the City of Oranges with bread. Let us halt for a brief period at the house of our worthy friend Panaderos, and watch the preparation of that delightful compound, which every traveller in the south of Spain has remarked as being so pleasant to the eye, so agreeable to the taste, and nourishing to the system. His wife and daughters are seated on low benches in the porch, sorting the wheat, which they separate both carefully and with expedition, consigning every objectionable grain to a basket reserved for the purpose. Singing some musical old ballad, and laughing merrily as they continue their light and pleasant employment, their lustrous eyes, blushing cheeks, pearly teeth, neatly braided hair, scrupulously clean small hands, and bright fanciful attire, remind one of the pretty little tea-pickers of China, warbling their favorite Moh-li-Hwa or Jasmin Flower amidst their heaps of Congou.

When ready, the wheat is passed through a mill on the premises, driven by a blindfolded mule, having a string of bells attached to its neck, which keep up a monotonous tinkling so long as it paces its round; and when it stops to rest, it is again set in motion by the cry, "arre, mula." The whole arrangement is as primitive, simple, and unpretending as that in use, according to the delineations on Egyptian sculptures, two thousand years ago. The resulting flour is passed through three sieves of different degrees of fineness, the wires of the last being so close together that only the pure flour is sifted through.

Evening is the time for bread-making at Alcalâ de Guadaira, when the female

portion of the community may be seen in their own houses making dough, into which, in contradistinction to our method, only a minute quantity of leaven is introduced. "A little leaven leaveneth the whole lump," we are taught in Scripture; here it is practised, — whereas at home, in order to avoid the labor of kneading, which it must be admitted is very severe, many of our bakers, where carbonic acid machinery is not employed, use as much yeast for one batch of bread as those simple people consume in a week. The dough, being ready, is placed in bags, and conveyed on the backs of mules to the great village oven, which is conveniently situated so as to accommodate the thrifty house-wives around. It is there divided into three-pound lumps, which are tossed on a long narrow table. These are immediately seized by a multitude of sturdy brown bakers, who knead each portion with all their strength for about four minutes, passing it on from one to another, until it has gone under the knuckles of all. Here again the process is similar to that of preparing tea, and reminds one strongly of the long rows of stalwart manipulators seen in the tea districts of China, making the fragrant leaf ready for market.

Such is the energy which those *panaderos* infuse into their work, that in course of time the palms of their hands, and the second joints of their fingers, bristle with corns; and the guttural "aha, aha," uttered by them as they thump and squeeze the yielding, gratefully smelling billows, is suggestive of the exclamations breathed by the hard working tea-bearers among the mountain defiles of Hounan and Oopack, as they trot down with their precious burdens to the various shipping ports.

Immediately on leaving the kneading table, where the lumps have, as a final process, been shaped into loaves, they are transferred to the oven. It is heated with wood, mingled with twigs of sweet marjoram and thyme, vast quantities of which cover the adjoining hill slopes, scenting the air with their rich perfume. There being no fire under the oven, the bread is never burned, the hottest period being when the loaves are introduced, which, being full of moisture, quickly acquire a crust that protects the crumb.

In this primitive Spanish village it is evident that an answer to our inquiries has been found in the simple words — pure flour, little yeast, much kneading.

Improper Handling of Children. — It is often painful to observe how little children are handled. It is not an uncommon practice for parents and nurses to catch them suddenly by the hand or arm, and *drag or hurl* them over some difficult spot, such, for instance, as a mud hole, or over a brook, if in the country; — or from the steps of a horse car to the pavement, or over some broken place in the pavement, or street; or over the gutter, if in the city, without a single thought about what the consequences might be from such procedure.

If parents and nurses who are guilty of such conduct will, by way of experiment, just allow themselves to be suddenly suspended by the wrist or arm, and at the same time hurled across a given space, they will have taken the first lesson in reference to the impropriety, not to say barbarous and brutal character, of such a practice.

Bathing.— A cold bath is invigorating when it is speedily followed by a sensation of warmth. Cold baths are dangerous to the old and feeble. It is dangerous to plunge into cold water when the body is cold or chilly. Warm baths are relaxing, and should not be taken in the morning.

Temperature. — Excessive heat, long continued, is detrimental to health. Excessive cold, long continued, is less prejudicial, except to the old and feeble. Sudden changes of extreme temperature are not necessarily injurious.

In general, the best temperature for health is that in which one cannot be comfortable for any length of time without exercise. With most persons this is a temperature of from 58° to 638 Fahrenheit.

SUMMER COMPLAINTS.

BY CARL BOTH, BOSTON.

NOT a summer passes, during which a large number of individuals do not fall victims to certain disorders of the digestive apparatus. Yesterday a person may have been seen perfectly well, and to-day we hear of his death: — died last night, of so and so. The very large number of *children* which the summer furnishes to fill our cemeteries throughout the country, is really appalling. But when we ask from what, or whence arise these sad phenomena, we meet with difficulties at the very threshold. The causes are too numerous, and the reasons so varied, that we cannot enter into detail; but, in general, they may be all comprehended and included in three words,— *Ignorance*, *Indifference*, *Carelessness*. This, however, is very much easier said or written than the evils remedied which they comprise; and the same is also true of all those affections which can be styled by the wholesale designation — summer complaints.

The greater mass of intelligent ignoramuses, as a matter of course, not only know a certain sure cure for so and so, but can explain with the greatest ease the most incomprehensible phenomena. Ignorance is bliss in many instances. There is scarcely an old woman who cannot cure summer complaint; there is not a dry-goods clerk, railroad conductor, or letter carrier, etc., who did not know that hot brandy punch, ginger-tea, or elixir of so and so, or of eating so and so, had cured so and so, in such particular case of so and so. Consequently summer complaint is the easiest curable thing in the world; especially if you yourself have not just now got it. In this latter case it is often a little difficult, and occasionally disagreeable, even sometimes funeral inviting. But how does it happen, that in spite of all the most sure and unfailing cures and remedies, the death reports remain the same? Notwithstanding the fact that almost everybody has seen or heard of different seemingly dangerous complaints being readily cured by a household, or patent remedy, punch, ginger-tea, etc., the disorders comprised under the heading summer complaints furnish to scientific men a field of difficult study in order that each case may be unfailingly comprehended and correctly managed. It sometimes occurs that the seemingly most dangerous complaints are nothing more than a temporary spasm of the nerves, which would yield to almost any kind of treatment; while other cases,— seemingly simple diarrhœa, or a slight occasional pain in the abdomen, — are followed by death.

The various causes of such difficulties are not really understood by any of those who have them. One knows that cucumbers are sure death, but dies in consequence of ice-water: another eats no fruits whatever to avoid diarrhœa, and dies of inflammation of his bowels; another protects his children from almost everything; to lose them, nevertheless, of cholera infantum or scarlet fever; in short, when we come to the point, every one knows all about it; but no one is certain whether he may not be sick to-morrow himself.

If we look into books for medical *practice*, we find numerous affections relating to the intestines well arranged and classified. We have a delineation of the symptoms, etc., of gastric complaints, of liver complaints, of diarrhœa, of dysentery, of cholera, of cholera infantum, of colic, of constipation, of enteritis, of peritonitis, of typhus, of typhoid, etc., etc., etc. We also find a large number of manipulations, remedies, etc., well recommended for each particular affection and its symptoms. Suppose we should take up all that has been written about the above well-defined disorders, know all the symptoms, and all the remedies that have ever been invented, we might well afford to treat any of them; but if we should be asked, What is cholera? what is typhus? what is diarrhœa? that would be a very different matter. Our answer might be — cholera, or so and

so, is a complaint which has such a history, and such and such symptoms, and such post-mortem appearances, and such and such remedies; and it is quite possible to answer such questions so well as to be able to pass an ordinary medical board of examiners, and yet to know nothing about it. When a person, or even a physician, tells us that so and so has the cholera, or diarrhœa, or typhoid fever, we cannot know exactly what *he* means, although we have read a good deal, and have heard still more about it; and we will tell you a secret, which you can keep or not, just as you please. *No one else knows much about it any way, save that they are words invented by necessity.* "What ails him, Doctor?" asks the wife. "A case of typhoid, with undecided symptoms, madam!" Madam is satisfied, but understands no more about it than she would had the answer been in Chinese; nor *do we suppose that* the doctor knows just what *he* means — only that it will be quite satisfactory to madam. Any number of physicians may agree in every particular in reference to a case of typhoid, and yet *not know what they themselves* REALLY *mean.* Such is the position of the general practice all over the globe.

The books for medical practice, with all their learned definitions and nice distinctions in their delineations of summer complaint, we find altogether unsatisfactory, and throw them overboard. In the light of Anatomy, with its necessary appendices of Physiology, Chemistry, etc., and with the aid of a little common sense, let us look at this subject from another stand-point. In place of names, books, authorities, wonderful medicines, or newly recommended modes of treatment, we will place before us a *canal* (the intestinal) of from 21 to 27 feet in length. This canal we find, on examination, to be constructed with large glands attached to it all along, connected with different nerves, blood-vessels, membranes, fat-cushions, etc., in the most peculiar manner. We are astonished about the complications of this wonderful machine, but find that not a single part of it is useless or superfluous. We now begin to comprehend a great many things that were entirely unknown to us; and that there is no end to all the incidents that might occur in such complicated machinery under certain circumstances.

We are now able to understand how extremely difficult it is to calculate all the possible derangements which must follow an almost endless variety of accidental causes, which may very easily occur through some little mistake. But as yet we have seen and learned comparatively nothing. We now take the microscope, and observe an entire new field of study. What appeared at first to the naked eye as a solid mass, is now seen as still more complicated machinery, even to its smallest details. We now see blood-vessels, of which we had no previous conception; — fine nets of nerves spreading under a beautifully arranged gland which absorbs or excretes the vital fluids; we observe the blood-cells floating busily along through their channels, getting caught here and there, shaping into different forms to pass a narrow place. On the slightest touch of a nerve, we observe a contraction of the gland with simultaneous excretion of its products. Upon continued irritation, we observe more blood flowing towards such gland, and it swells in proportion until it interferes with the business of its neighbor. We press upon the blood-vessel, and a darker appearance is quickly observed, cell upon cell seems to press in until the vessel is filled up to the next branch; — if we hold on long enough, a clot is formed by which this vessel is made impassable. . . . We inject some foreign substance into the veins of the foot, and after five minutes we see it pass before us, mixed with the blood which now shows a different activity, while its flow seems irregular and spasmodic; — by and by we observe the flowing to become slower and slower, until it ceases altogether. We look at it with the naked eye, and observe a little red patch, but no more. Thus we may continue to amuse ourselves until we begin at once to reflect, and to think of the consequences of

such transactions. Supposing the same should happen in ourselves, what should we do? We have already seen too much to be fooled any longer with mere names, remedies, and nonsense. We know that the observed irregularities which we brought about artificially, cannot be removed by a simple dose of castor-oil or salts, nor by any infinitesimal dilutions of a humble bee. Having once examined and seen into the minuteness, extreme delicacy and nicety of the machinery, we are afraid to fool with it any more. It is with us, as with the boy who could laughingly torture a poor bug, until once he examined and studied it thoroughly; when, after the knowledge gained, he carefully avoided stepping upon it; so with ourselves, having gained a knowledge of the machinery of our body, we avoid abusing it.

A child suddenly becomes very sick; — being called to attend it, we find a beautiful child lying on its bed, asking for help from its mother, and crying as we enter, from fear and from pain. What is the matter? No one knows much about it,—the child has vomited, throws the head around, cries when trying to go to stool, and refuses all kinds of food. There is no fever, but the child looks frightened and anxious. On examination, we find its abdomen swelled and hard; we feel the motion of the intestines; evidently the child suffers pain. Should we not give opium, and a dose of castor-oil? We might, but we dare not. Shall we try Homœopathy? It will do no harm, at any rate, and perhaps it might be of service. Or shall we try a warm bath, with a battery in it? Or a dose of calomel, and *say* that it was Homœopathic medicine? Or perhaps some worm medicine might not be bad. Chloral being the latest discovered and newest remedy out, we might try it, and, if successful, publish something about it; it would give notoriety! We might rub something on its bowels. While we thus soliloquize, an old aunt comes in; she has had a number of children of her own, some of whom have died. "Why don't you give it an injection, Doctor?" "Yes, madam" (we did not think of it just now when we were soliloquizing), "an injection can do no harm;—an injection of equal parts of sweet and castor-oil, mixed with a sufficient quantity of warm water, with a little soap in it." We remember having read about applying hot wet cloths to the abdomen; so we order this to be done. "Dont you prescribe, or give some medicine?" asks the mother. Yes, we must have some medicine; so we prescribe some peppermint-water, three drops every hour. Before the bottle arrives, our child seems better; — the injection produced a full discharge, the abdomen is less swollen, the child is more quiet, and falls asleep and must not be awakened. After three hours it awakes and smiles — we give it three drops of peppermint-water, tell the mother and aunt "*to be very careful*" with the child, and call again next day. The child now meets us on the steps perfectly well. Very hard case!!! "What was the matter with the child, Doctor?" "Oh! it had an attack of spasmodic colic, which would have resulted in summer complaint or enteritis." "Oh yes, I understand — it is quite dangerous, is it not?" "Yes, madam!" She understands, and we don't — but nevertheless are called to another child having the same symptoms. Ah, now we know what to do — we prescribe; — an injection, hot cloths, and peppermint-water, as before. But this child will not sleep; — we try again, but to no purpose. What now? We give castor-oil. It is vomited up, the pain becomes more severe: we give opium; — is thrown up; — we try brandy with tartar-emetic; — is thrown up also. Things are becoming alarming and desperate, we call in counsel; — try everything, but all to no purpose, — the child dies on the fourth day. Upon post-mortem examination we find that the intestine has pushed itself up into itself about ten inches (intussusception). We now see that there was no use for our remedies in this case; there was no help this time. Everybody is satisfied but ourselves,— we do not know much after all, and feel a little ashamed, but must not let it be known, as it

would not do! We ought to have known all about it. The first child, in playing with other children, had been laying with the abdomen unprotected upon the cold and damp ground, thereby reducing the temperature of the intestines, until spasmodic contraction of the nerves which govern the motion of the intestines took place. Our treatment was therefore a correct one, and the child got well. The other child had not chilled its bowels by exposure. Post-mortem examination would have shown inflammation (obstructed capillary vessels) of the brain, which the child had got from some accident unknown to us; the seeming difficulty in the bowels being only reflex action from the brain.

These two illustrations are sufficient to convince any one that the very same symptoms may arise from widely different causes; and that the secret of all appropriate and successful treatment must come from a thorough knowledge of this subject. Therefore, to give specific remedies for summer complaint in any or all of its almost endless forms, is not only quackish, but foolish and abominable. No one can correctly treat any disorder, whatever its name or symptoms may be, without thoroughly understanding the minute anatomy of the parts affected; — this is a study the largeness of which can only be comprehended properly by the one that undertakes it.

The following is about all that can possibly be said on this subject: If a mother, or any other person, wishes to avoid in themselves or their children any disorder of any kind, it is absolutely necessary for them to understand the general rules of dietetics and digestion. To think or reason comparatively, is the next best aid for correct self-actions. This is the only way by which to avoid any such fatal disorder as summer complaint. If, however, anything of the kind should occur, the following manipulations are most strongly recommended. Until a good, common-sense physician, who has a competent knowledge of anatomy, can be procured, let wet hot cloths be applied to the abdomen: it is always harmless. For obstinate constipation of the bowels, use nothing but warm injections (except by advice of a competent medical man).

Never attempt to arrest suddenly any diarrhœa by any kind of medicine, however highly recommended: diarrhœa is only the consequence or result of the disorder, and not the disorder itself. One of the greatest mistakes which is committed by physicians, as well as laymen, is the premature arresting or removal of symptoms, without comprehending their cause and nature. Thousands die annually of this foolish mistake. In case no physician that is worthy the confidence of the afflicted can be obtained, the following is allowable: Take peppermint water, and dissolve a moderate quantity of gum-arabic in it, and take a spoonful of it every half hour. For pain in the abdomen, use hot water applications ONLY. The region of the stomach, in such cases, will almost always feel cold to the hand. Eat and drink nothing until a decided craving for a certain article manifests itself. If this craving is for acids, lemon-juice, or strong sour lemonade, with gum-arabic (hot or cold, as indicated), is the proper thing; if for salt, Saratoga star spring, or any similar saline *spring* water, is the correct thing. Salt is one of the most necessary ingredients for the blood, especially in the hot season. Next comes vegetable acids. All acid fruit is healthy, while sweetish and pulpy ones are more difficult of digestion, and sometimes somewhat risky, especially in combination with other food or water. It is hardly necessary to remark that people should eat less heating food in summer than in winter. Children should live in summer principally on milk, good coarse bread, and fruit. To drink excessive quantities of water, especially lake-water, with ice, is not only foolish, but dangerous.

Small children should be lightly dressed, and should wear a flannel bandage around the abdomen, instead of the chest. When a child shows the slightest symptoms of disorder, it should be brought to bed immediately. It should next be properly examined by a

competent medical man. It requires nothing but common sense to distinguish between a physician and a quack. The first examines like a surgeon, very carefully according to the anatomy of the body, and when he has finished, can *always give an anatomical explanation of the matter*, comprehensible, even, to a child. The quack is exceedingly accommodating, knows all about it in a minute, has had hundreds of cases, very difficult, but always successful, tells you the name of the disease at once, gives or prescribes medicines of which neither you nor he himself knows any more than that his great experience has made it unfailing, is always ready to call in a counsel of half a dozen more like himself, that he may be able to shift the responsibility and blame in case of any trouble. So anxious is he on this last point, that when all other subterfuges fail, he will as a last resort shift the responsibility by talking about the infallible will of God, against which all human wisdom is as nothing. Believe nothing but what your common sense can comprehend, and you need have no fear of being fooled by any medical quack, whatever his standing in society. If an adult experiences difficulties in his abdomen, he should call in a physician; if momentarily prevented from doing so, and must keep on his feet, he should put a flannel bandage around the abdomen: 1st, to keep the intestines warm; 2d, to prevent any unnecessary motions of them brought about by exercise. If possible, take to your bed at once, and before it is too late; and unless you have a knowledge of dietetics, stop eating and drinking, until you have informed yourself of what is best or most suitable under the circumstances. Simple water may be as dangerous in some particular cases as poison. Is there an inclination to vomit? Put your fingers in your mouth, and encourage it while lying on your stomach. Take no medicine whatever until you know what it is, and what it is for—because by so doing you may, through foolish confidence in medicine, neglect to do what should be done; and besides, if it is any very effective medicine, and one which is not indicated by the disorder, it will do very great injury. Any medicine that can be effective for good, is equally powerful for mischief if injudiciously used. In eating, consult your instinctive taste in preference to anything else. It should not, however, be forgotten that a correct knowledge of how to eat, to drink, and to use the bodily machine, with corresponding action, *is an unfailing remedy against all sickness.* As the machinist knows that his boiler cannot explode if properly managed, so the physician knows that your body cannot be sick without a just cause for it. There has been a great deal written on this subject; and scientific men, the world over, are always willing to assist any effort on your part for information, but it will not enter your head by chance; neither will the cholera, typhus, or any other disorder. It should be borne in mind, that the length of the natural life is at least 70 years; and, therefore, that *every death previous to that age is the result of ignorance, foolishness, or bad practice.* The moment we come fully to comprehend this truth, and also that all of us, without exception, have in some way our share of foolishness, in connection with a fixed purpose to be rid of it, that moment we may lay aside all fears in reference to summer complaint. This is no patent medicine; but we guarantee its effectiveness when administered.

In conclusion, we would again remind our readers, that a *disease as such*, has no existence whatever, in the air, water, clothing, or *anywhere else*, except in the imagination of those who are not properly and thoroughly educated. Every phenomenon in nature has a certain cause for it. This cause may be known, or, if unknown, is not therefore supernatural or incomprehensible. If we should speak of a disease of the clouds, everybody would laugh at our ignorance, but if we tell a patient that he has the cholera morbus, he will believe us in good earnest. Every ailment we have is simple, when once we understand its cause, but wonderful and incomprehensible if we know nothing of *cause and effect.*

BALLOONS AND BALLOONING.

A. RAYMOND, BOSTON.

SINCE the days when Dædalus and Icarus made their fabled flight over the Ægean, on wings fastened to their shoulders with wax, down to the present time, the construction of a machine, as fitted for navigating the air as a ship is for sailing on the sea, has been a task essayed by many men of scientific pursuits and mechanical ingenuity, and their efforts, as everybody knows, have hitherto been anything but successful: indeed, the history of aëronautic science is a story of failures.

Francis Lana, in 1670, so far as is known, gives the first idea of a real balloon, but the brothers Montgolfier were the first persons who constructed one, although scientific men were acquainted with the principles upon which such apparatus should be constructed for some years previous.

Hydrogen gas was discovered by Cavendish in 1776, and as this gas was found to be the lightest substance known, (100 cubic inches weighing only a little more than two grains,) Cavallo, the eminent electrician, immediately after began to make experiments in aërial sailing.

The brothers Montgolfier constructed a vessel 110 feet in circumference and of 500 lbs. weight; with this they intended to navigate the air, and they called their new vessel a "balloon."

The first public experiment was made June 5th, 1783, at Annonay, near Lyons, in France. The balloon was merely a spherical bag made of pieces of coarse linen, loosely buttoned together, and inflated with rarified air, produced by kindling a fire underneath it. The fire was constantly fed with small bundles of chopped straw, until the balloon was sufficiently distended, when it was loosed from its stays and rose to the height of about a mile, and then descended, having been suspended in the air for the space of ten minutes.

In Paris, on the 27th of August of the same year (1783), a similar ascent was shown by M. M. Robert and Charles, who constructed their balloon of thin silk, and inflated it with hydrogen gas.

On the 19th of September, the brothers Montgolfier, having accepted an invitation from the Academy of Sciences to repeat their experiment of Annonay, on a larger scale, in Paris, sent up a balloon from the grounds of the palace at Versailles. On this occasion the passengers consisted of a sheep, a duck, and a cock, and were the first animals ever carried up into the air in this way.

The first *person* who ascended was M. Pilâtre de Rozier, on the 15th of October of the same year. When the Montgolfiers were sending up a balloon, he boldly leapt into the car or basket just as the machine was leaving the earth, and ascended to the height of 100 feet, the balloon meanwhile being secured by ropes from below, and thus gained the fame of having been the *first man* who ventured on an aërial voyage. On the 21st of November following, de Rozier and the Marquis d'Arlandes first left the earth entirely, in an aërostatic balloon of M. de Montgolfier, when the balloon rose at least 3,000 feet in height.

The first balloon seen in England was constructed by an ingenious Italian named Zanbeccari; it consisted of oiled silk, and was about ten feet in diameter, and its exterior was entirely gilt. It made its first ascent on November 25th, 1783, and appears to have attracted considerable attention.

To remove the incredulity on this subject, which was very strong among the masses, the London *Morning Chronicle* took the trouble to get reliable information about the French balloons, and on the 11th of December, 1783, had an article headed, "Air Bal-

loon," from which we make a short extract:—

"As many persons in this kingdom still discredit the relations conveyed in the French papers respecting the air balloons, we have the authority to use Dr. Lettsom's name for the following genuine communication from his correspondent at Paris, dated the third of this month:—'On Monday, an air balloon made of taffaty, covered with a solution of gum-elastic, was filled with inflammable air, under the direction of Messrs. Charles and Robert, and was let off from the Thuilleries. It had suspended to it a basket, covered with blue silk and paper finely gilt, in the shape of a triumphal car or short gondola, in which Mr. Charles and one of the Roberts embarked and mounted up into the air, from amongst many thousands of people of all ranks and conditions. Besides the Duke de Chartres and a great part of the French nobility, there were present the Duke and Duchess of Cumberland, the Duke and Duchess of Manchester, and many other foreign princes and nobility. The triumphant cars of Venus, Medea, and various others, seemed to be realized; with this difference, this was neither drawn by peacocks, doves, nor dragons; neither was it mounted on a cloud; it was, however, a most majestic spectacle.'"

This authentic narration of a balloon ascent in France was calculated to allay suspicion, and prepare the public mind for a further draft upon their credulity, to which the *Chronicle* treated them, to the following effect:—

"It is well known that a pair of wings and a tail of the most curious workmanship are constructing for a person, who, in the spring, is to be sent off upon an air balloon. They are to extend twenty yards each way, and in form to be similar to those of a bat, having silk instead of feathers. With the help of the wings and tail, the man, when extended on the air balloon, will be able to guide himself to whatever part of the country he may wish to go. The wings above-mentioned are making at the instance of a person of very high rank in Paris, and who has betted five thousand guineas that the foreigner who has undertaken this scheme makes a safe passage from Dover Cliff to Paris."

What became of the poor foreigner who proposed to emulate the feat of Dædalus and fly across the sea, we do not know; but we think we may say with certainty that the person of very high rank lost his wager and his guineas.

Soon after this, balloon ascents became common enough in England. The first person who went up in a balloon on the English side of the Channel was a countryman of Count Zanbeccari's, named Lunardi, who made an ascent from London on the 21st of September in 1784.

In 1784, Dr. John Jeffries, an American physician, and the father and grandfather of the present Drs. Jeffries of Boston, Mass., in company with M. Blanchard, made an ascent on Nov. 30th of the same year, in which they were suspended in the atmosphere for an hour and twenty minutes. On the 7th of January, 1785, these gentlemen made a second ascent, from the cliffs of Dover, crossed the English Channel and landed in the forest of Guines in the Province of Artois, in France, accomplishing this aërial voyage in two hours and forty-seven minutes. The account which the Doctor gave of this voyage, very soon after it was accomplished, is so interesting that we transcribe a portion of it for our readers.

"The morning was remarkably fine, clear, and serene, but with intense frost. Exactly at one o'clock, we rose slowly and majestically from the cliff, which, being at the time of our ascent from it, almost covered with a beautiful assembly from the city, neighboring towns and villages, with carriages, horses, etc., together with the extensive Beach of Dover, crowded with a great concourse of people, with numbers of boats, etc., assembled near the shore, under the cliffs, afforded us, at our first arising from them, a most beautiful and picturesque view indeed.

"The weather continued delightful, and we began to have a most enchanting prospect of the distant country

back of Dover, etc., enjoying in our view a great many towns and villages; among which I could distinguish the venerable city of Canterbury.

"We passed over several vessels of different kinds, which saluted us with their colors as we passed them; and we began to overlook and to have an extensive view of the coast of France; which enchanting views of England and France being alternately presented to us, greatly increased the beauty and variety of our situation.

"At half-past one o'clock the balloon seemed to be distended to its utmost extent, and thereby drew up the car close to it; and as it was not possible to determine exactly how much gas might escape if we opened the valve, we *only untwisted the two tubes at the bottom of the balloon*, by which it had been filled, and cast them over the sides of the car; by which method no more gas escaped than was absolutely necessary to relieve the balloon, and to prevent it from bursting.

"At fifty minutes after one, I found we were descending fast. We immediately took in the tubes within the car, and secured them, and cast out one sack of the ballast, and then half another sack, on which we began to rise.

"At two o'clock, we found that we were descending again; and were obliged to cast out the remaining sack and a half of ballast, sacks and all; and also a parcel of pamphlets, and in a minute or two found that we rose again; and now appeared to be about midway between the English and French coasts.

"At about a quarter after two o'clock, I found that we were again descending; this induced us to cast out, by small parcels, all the remaining pamphlets; notwithstanding which, I could barely discover that we rose again.

"We had not now anything left to cast away as ballast in future, excepting the wings, apparatus, and ornaments of the car, with our clothes, and a few little articles; but as a counterpart to such a situation, we here had a most enchanting and alluring view of the French coast. At about half-past two, I found we were again descending very rapidly, the lower pole of the balloon next us having collapsed very much, so that the balloon did not appear to be three-fourths distended with gas.

"We immediately threw out all the little things we had with us, such as biscuits, apples, etc., and after that one of our oars or wings; and then the other wing, and governail; and finally the moulinet, with all its apparatus; but the balloon not rising, we cut away all the lining and ornaments, both within and on the outside of the car, and threw away the only bottle we had taken with us, which, in its descent, appeared to force out a considerable steam, like smoke, with a hissing or rushing noise; and when it struck the water, we very sensibly felt the force of the shock on our car; it appearing to have fallen directly perpendicular to us, although we had passed a considerable way during its descent. As we did not yet ascend, we were obliged, though very unwillingly, to throw away our anchors and cords; but still approaching the sea, we began to *strip ourselves* and cast away our clothing, M. Blanchard first throwing away his *extra coat*, with his surtout; after which, I cast away my *only coat;* and then M. Blanchard his other coat and trousers: we then put on and adjusted our cork jackets, and prepared for the event.

"We appeared at this time to be about three quarters of the distance towards the French shore, and so low as to be beneath the plane of the French cliffs; but on looking around I soon observed that we were rising, and that the pleasing view of France was enlarging and opening to us every moment as we ascended, so as to overlook the high grounds.

"We now ascended to a much greater height than at any former period of our voyage, and exactly at three o'clock we passed over the high grounds between Cape Blanez and Blackness, at which time nothing can exceed the beautiful appearance of the villages, fields, roads, villas, etc., under us, after having been just two hours over the sea.

"The weather still continued fine and very clear, the rays of the sun,

though almost horizontal, shining very bright; but from the height which we were now at, and from the loss of our clothes, we were almost benumbed with cold.

"We now found ourselves approaching towards a forest, which, appearing to be more extensive than it was probable we should be able to pass entirely over, we cast away one cork jacket, and soon after it the other, which almost immediately checked, and altered the angle of our descent.

"We had now approached so near to the tops of the trees of the forest, as to discover that they were large and rough, and that we were descending with great velocity towards them; from which circumstances, and from the direction of our course at this time, fearing that the car might be forced into some of the trees so violently as to separate it from the cords that connected it with the net which covered the balloon, I felt the necessity of casting away something; but happily, as we were approaching some trees of the forest higher than the rest, we passed along near them in such manner as enabled me to catch hold of the topmost branches of one of them, and thereby arrest the farther progress of the balloon, which, almost the instant the car touched the trees, so as to take off a part of its weight, was disposed to ascend again; and in that position continued for a considerable time waving over our heads, making a very pretty appearance above the woods, until, having for some time held the valve open, a sufficiency of gas had escaped to dispose the car to settle on the branches, when disengaging and pushing it from one to another, we found sufficient space between the trees to admit us to descend tranquilly to the surface of the ground, a little before four o'clock, it having been about half after three when I first stopped the progress of the balloon over the forest, which I have since been informed is called the *Forest* of *Guines*, not far from *Ardres*, and near the spot celebrated for the famous interview between Henry the Eighth, King of England, and Francis the First, King of France.

"My chief object in this last aërial voyage, was the novelty and enterprise of being *one of the first who passed across the sea from England into France* BY THE ROUTE OF THE AIR."

Thus the feat of crossing the English Channel in a balloon, was first successfully accomplished by an American, as above related.

A monument was subsequently erected by THE FRENCH GOVERNMENT to commemorate the event, and placed in the Forest of Guines, on the spot where Dr. Jeffries and M. Blanchard alighted after their aërial voyage from England into France, the seventh of January, 1785.

It may also be interesting to know that the car attached to the balloon, and used on the occasion, can be seen in a museum at Calais; and that the barometer which was used during the voyage is now in possession of Dr. Jeffries, in Boston.

At a somewhat later date (June) of the same year in which Dr. Jeffries made his successful aërial voyage, M. Rozier, who had been the first to ascend in a balloon, in making the attempt to cross from France to England, lost his life, and was the first man killed by ballooning.

From the period of Dr. Jeffries' ascent to the present, it does not appear that any very important improvements in constructing aërial machines have taken place; the grand desideratum is to discover a means of steering them.

Dr. Johnson's remarkable acumen displayed itself in the discussion of the practical value of the new machines as a means of locomotion. He writes to his friend and physician, Dr. Brocklesby, September 29, 1784: "On one day I had three letters about the air-balloon . . . . In amusement, mere amusement, I am afraid it must end, for I do not find its course can be directed, so as that it should serve any useful purpose." And again, in a letter addressed to the same gentleman, and dated October 6th, Dr. Johnson says: "The fate of the balloon I do not much lament; to make new balloons is to repeat the jest again. We now know a method of mounting into the air, and

I think are not likely to know more; the vehicles can serve no use till we can guide them." And in the art of guiding them, no real progress has been made during the eighty or ninety years that have elapsed since they were first constructed. They are what they were, neither more nor less than ingenious toys; and during that interval, the history of balloons is but an account of ascents, either as a holiday attraction, for military reconnoitering purposes, or for the purpose of scientific inquiry into the state of the atmosphere at different heights from the earth's surface.

The longest aërial voyage ever made in Europe is that of Green, Holland and Mason, who travelled 500 miles in 18 hours; and the longest in America was from St. Louis, Mo., to Canada, a distance of nearly 1,000 miles.

The greatest attitude ever reached by an aëronaut, was made by Glaisher and Coxwell, of England, in 1863, who ascended to the height of 31,680 feet, or 6 miles above the level of the sea.

INSTINCT AND REASON.

ONE of the most affecting anecdotes we ever read was published many years ago in "Rural Sports." Shortly before Robespierre's sanguinary rule came to an end, a magistrate of unblemished character was seized by the revolutionary tribunal on a false accusation of conspiracy, and condemned to the guillotine. During the interval that elapsed between his committal to prison and the execution of the sentence, his faithful dog, a spaniel, who was with him when arrested, and had, when prevented from sharing his master's cell, taken refuge at a neighbor's house, presented himself daily, at the same hour, at the prison gates. For some time the jailer, afraid of the consequences to himself, refused the poor animal admittance. He nevertheless always remained a certain time before the gate, and at last the jailer, touched by his patient fidelity, allowed him to visit his master every morning. When sentence was pronounced the faithful attendant made his way into the court; when the fatal knife fell he was also present, and watched the headless corpse till it was buried. From that time, for three months, the mourner only left the grave once a day to visit his new friend and receive food, immediately returning thither when the wants of nature were satisfied. After this period it appeared as if his patience were worn out; he would no longer eat. "With temporary strength, supplied by his long-tried and unexhausted affection, for twenty-four hours he was observed to employ his weakened limbs in digging up the earth that separated him from the being he had served. His powers, however, here gave way; he shrieked in his struggles, and at length ceased to breathe, with his last look turned upon the grave."

In Bochart's "Hierozoicon," a work on the animals mentioned in Scripture, published in 1663, he alludes to an instance, at the time well known in Paris, of a dog who might be seen any day on the spot where his master had been interred three years previously. In a like case at Lisle, the sympathies of the inhabitants were enlisted for the faithful mourner, and a large kennel was erected over the grave, and food regularly conveyed to him. There he remained till his death, nine years afterwards. The more recent case of Greyfriars "Bobby" at Edinburgh is well known.

Then, again, have not animals their jealousies? "No one," says a recent writer, "who has had opportunities of seeing two dogs together, one a new and the other an old favorite, can doubt this."

In the endeavor to support the opinion of Locke, that animals sometimes reason, we will now lay before the reader a few more facts.

A certain degree of heat is necessary for the hatching of the eggs and well-being of the young of ants, and they take no small amount of trouble in often removing their charge from one part of the nest to another, according to temperature. Reaumer mentions that several colonies of ants, at different times, took up their abode between his glass hive and its outer case, thus saving themselves an immense amount of labor and securing for their young a proper and equable temperature. The same fact came under the notice of Bonnet. In the latter instance, the outer case of the hive was lined with flannel, and, no doubt, the ants felicitated themselves on getting into such snug quarters. The glass, as Kirby remarks, being a tolerably good conductor, would assist in keeping up a moderate degree of warmth. His comments here are so extremely pertinent, that I cannot resist quoting the passage entire. "It is impossible," he says, "consistently to refer these facts to instinct, or to account for them without supposing some stray ant, that had insinuated herself into this tropical crevice, first to have been struck with the *thought* of what a prodigious saving of labor and anxiety would occur to her compatriots, by establishing their society here; — that she had communicated her *ideas* to them; and that they had resol-

ved upon an emigration to this new-discovered country — this Madeira of ants — whose genial clime presented advantages which no other situation could offer. Neither instinct, nor any conceivable modification of instinct, could have taught the ants to avail themselves of a good fortune which, but for the invention of glass hives, would never have offered itself to a generation of these insects since the creation; for there is nothing analogous in nature to the constant and equable warmth of such a situation; the heat of any accidental mass of fermenting materials soon ceasing, and no heat being given out from a society of bees when lodged in a hollow tree, their natural residence. The conclusion then seems irresistible, that reason must have been their guide, inducing a departure from their natural instinct as extraordinary as would be that of a hen which should lay her eggs in a hot-bed, and cease to sit upon them."

Dr. Darwin once noticed on the gravel walk of his garden, a large fly in the clutches of a wasp, which, after cutting off the head and lower part of the body, flew away with the remaining portion, to which the wings were still attached. A slight breeze, however, which was stirring, affected the wings of the fly so as to cause its captor's progress to be anything but plain sailing. Finding out what was the impediment, the wasp took to earth again, severed both wings from the body, and, thus relieved from its difficulty, flew off. This was surely a process of reasoning equivalent to that which leads a mariner to lower his sails in a head wind.

M. Huber, to whose many and painstaking investigations into the "manners and customs" of bees we have already had occasion to advert, records the following anecdote. He placed on a small table, under a bell-glass, a dozen humble-bees and a comb consisting of about as many cocoons, which, not being of uniform height, caused the mass to rock about when the bees mounted upon it, as their instinct prompted them to do, to supply from their bodies the requisite warmth for their young. This unsteadiness evidently bothered them; but how was it to be rectified? By a device which the reader might guess long enough without finding out. Several of the bees, planting themselves on the edge of the comb, head downwards, set their forefeet against the table, and, with their hinder claws attached to the comb, in this manner secured its stability. For nearly three days they continued to steady it by this means, relieving each other at intervals. By the end of that period they had a supply of wax ready, of which they constructed pillars to support the comb. These, somehow or other, giving way, the patient and intelligent little creatures at once reassumed their office of animated buttresses. At last the naturalist took compassion on them and cemented the comb to the table. "How could the most profound architect have better adapted the means to the end — how more dexterously *shored* up a tottering edifice, until his beams and his props were in readiness?"

We forget where we met with the next instance, but we know it was given on good authority. One of the large gray slugs which are such dire nuisances in greenhouses, found its way into a hive, and being quickly discovered by the inmates, was attacked and stung to death. The question now was how to dispose of the corpse. To remove it from the hive was out of their power, and yet its decomposition indoors would be an offence to their olfactories. They hit upon the plan of covering it over entirely with wax and propolis (a glutinous matter obtaned from the buds of various trees, as the birch, etc.), so as to exclude the action of the atmosphere — proceeding, in fact, on the same principle by which our merchants preserve meat and other provisions in canisters for long voyages.

In a farmyard in Berkshire, where the piggeries were railed off on one side, the fowls were accustomed, when the feeding-troughs were replenished, to assemble in a body, and, flying over the rails, help themselves in no stinted measure to the good things provided for their swinish friends. A stop was put to these predatory incursions by the clipping of the fowls' wings; but, some pigs chancing to be at large in the yard, a bright idea struck one of the hens, who, seizing her opportunity when a pig wandered close to the railing, flew on to its back, and then found no difficulty in reaching the top, and thence descending, as formerly, to the interdicted diet.

With regard to certain birds of passage, it has been often remarked that those which migrate from Scotland to Ireland cross over at the Straits of Portpatrick, that they wait for a side wind, and set out in the early morning — thus adopting precautions precisely similar to those used in the early days of navigation by our ancestors, when they chose the narrowest parts of the channel to cross by, and preferred to have the whole day before them.

An amusing instance of a dog's *cuteness* is related by a contributor to "Loudon's Magazine." While an omnibus was waiting at one of its regular stations for receiving passengers, a dog of the setter breed bounded in at the open door, and resisted every attempt on the part of the occupants and conductor to put him out. At none of the various stoppages on the way did he show the slightest inclination to move, till the omnibus arrived at the Eagle Tavern, in the City Road, when, the door being opened, he immediately jumped out, and walked off as if well acquainted with the locality. The contributor of this story was a passenger by the omnibus, and he appropriately enti-

tles his communication, "A dog that reasoned riding to be preferable to walking."

Do animals gain knowledge by experience? The younger Huber it was, we believe, who first called attention to the fact that large humble-bees, after in vain attempting to insert the head and thorax into the narrow-tubed flowers of the bean, so as to reach with their proboscis the nectary at the bottom of the tube, found out a way of obtaining their luscious diet by drilling a hole in the lower part of the tube, through which they insinuated their sucker. Various naturalists have since corroborated this testimony, and have also specified the common columbine, marvel of Peru, and several kinds of monkshood, as having their blossoms perforated in the same way.

That the lower animals are not altogether strangers to the connection between cause and effect, we may presume from the reports of various trustworthy observers. An instance is mentioned by Dr. Fleming. He speaks of having frequently, when in Zetland, seen the hooded crow break the shells of those molluscs which were too hard to be put *hors de combat* with its bill alone, by beating them against stones. With some of the larger species, having harder and stronger shells, a different course of treatment is adopted. The crow, with the shell in its claws, rises in the air to what we may suppose it fancies the proper distance, and lets the captive mollusc fall among stones: never on the sand nor any soft place. Should the first attempt not be successful, a second is tried; and if that fail, a third, and so on — the bird each time mounting higher, so as to increase the momentum of the fall — till the shell is shattered in pieces, and the tempting mouthful becomes attainable.

Amongst the multitude of examples, with some of which almost every one must be acquainted, exemplifying the power possessed by the inferior animals of intercommunication of ideas, it is somewhat difficult to select any having the charm of novelty. We may remark in passing, that, unendowed with the ability for mutual conference, the proceedings of bees, in a hive, instead of being method itself, would often end in "confusion worse confounded." In more than one of the anecdotes quoted above from Huber, we have seen bees acting together in an evidently concerted manner. A French author of the last century gives an amusing account of the punishment inflicted on feathered delinquents by those whom they have wronged. The house martins are, as their name implies, in the habit of building their nests under the eaves of dwellings, and it is not at all an uncommon circumstance for a sparrow, with the impudence inseparable from its nature, to instal itself in one of these nests during the absence of the owners, and set at defiance every "notice to quit." The martins, finding it impossible to oust the intruder, who, like many other bipeds, probably thinks "possession nine points of the law," summon their friends to their assistance, and, while two or three of the party keep watch at the door of the nest to prevent escape, the others bring supplies of clay, and completely closing up the entrance, leave the unfortunate victim to die by suffocation. The "luxury of revenge," as it has been strangely termed, would appear by this account to be thoroughly appreciated by the martin tribe. Now in a case of this sort some conversation, or whatever we choose to call it, must take place between the proprietors of the nest and their friends. We may suppose the application for assistance to run something in this form. "Martins and brethren, here's an impertinent sparrow got into our house, and won't either leave it or let us in. Will you kindly come and help us to bury him alive? It's the only thing to be done with him."

The following anecdote is very interesting: A young lamb had become entangled in a briar-hedge; its own struggles, and the efforts of the mother, persevered in for a long time, were unavailing to set it at liberty. Finding at length that additional help must be obtained, the parent set off at a rapid pace across three large fields and through as many hedges, bleating in a most dolorous fashion. In the last field were a flock of sheep, to whom she no doubt told her story, for she shortly returned, attended by a large ram, who used his immense horns to some purpose, speedily dragging away by them the encircling briars, and freeing the captive.

Life Insurance.—What can Life Insurance effect for us? It enables every man, no matter what his station in life may be, to provide for his family in the event of his premature death, by small periodical payments, which could not, by any other means, be productive of so much good; or if he has no family depending on him, he can secure an endowment, payable to himself in his old age, when the day for work is past, and when the absence of those comforts which in earlier years were the reward of labor, is felt with the acute sensibility of old age.

It enables a wife to insure her husband's life for the benefit of herself and children, without the policy being subject to the claim of creditors, even should her husband have been, at the time of his death, a bankrupt.

It enables parents to secure the education or establishment of their children in business, by means of endowments on their own lives, made payable at the time when these children would be prepared to enter on the active duties of life. It is useful in cases of loans where a policy given as collateral security facilitates the completion of the loan, and it enables executors or adminstrators to close up satisfactorily the trusts

committed to their charge without the sacrifice of any important interests. It is particularly useful in cases where mortgages are held on farms or homesteads, and the death of the mortgager before the payment of the mortgage would expose the property to the danger of foreclosure. There is no station in life to which a policy of life insurance will not bring its value. It is the "begone, dull care" of the age we live in, as it enables us to enjoy life without any harrowing cares as to our families' future. This is the plain and practical view to take of it. Strip it of its benevolence, and its usefulness still remains. To the father of a family it is indispensable. So long as he keeps his premium paid, he can enjoy to the fullest extent the happiness God has placed within his reach without any fear of poverty in the future for his wife and children. Poverty! Have such of us as are in comfortable circumstances ever realized what it is, and what degree of it is hardest to bear? There are different degrees of pleasure and enjoyment suited to different tastes, and there are also different degrees of poverty, which press with greater or less anguish, according to the former position in life of those on whom it had laid its blighting grasp. The ordinary poor, from long association with want, cease to feel its pressure, and their sensibilities become so blunted as to make them in a certain sense satisfied with their lot. But the poverty hardest to bear, and which brings with it the keenest suffering, is that which is best known as "genteel poverty"; that which is silently borne by families who are suddenly brought from a good position in life to a state of want and hardship by the untimely death of husband or father. Here is where the bitterest sting of poverty is felt, in the sudden change from the enjoyment of comfort to the necessity of ekeing out a subsistence or dependence on the favors of friends, in most cases grudgingly bestowed.

The whole system of Life Insurance is fraught with untold blessings, if we would gather them. Its *cost* is trifling compared with its *advantages*, and in the interest of those committed to our keeping by an All-wise Providence, the solemn obligation imposed on us should be discharged by effecting a life policy, if no better means presented itself.

"Life's duties well performed,
Will render sweet results."

TECHNOLOGIST.

GEOLOGICAL PAINTINGS.—One of the most remarkable features of this century is the popularization of science by the greatest thinkers and scientific discoverers. What was formerly called science, was a mysterious, illogical compilation of nonsense and notions, not fit for the open air, and less for criticism. Any scientific truth is simple, clear, and capable of being demonstrated even to a child. There is nothing in any branch of science which cannot be explained, demonstrated, and clearly proved. Whatever may be represented as science, but is kept behind closed doors and mysterious grimaces while it cannot endure open investigation — criticism and attack — is nothing but humbug and nonsense. It therefore becomes the duty of every well-meaning man, and also of a respectable press, to support, and to aid in popularizing every worthy effort which tends to exhibit, explain, and demonstrate scientific facts.

Mr. Adolphe Rohde, from Berlin, has exhibited in New York and Boston, Geological Paintings, magnified in large diameter, which are accompanied with an explanatory lecture upon the development of the earth. This lecture, which has been emended and revised by the highest European authorities, is intensely interesting and instructive. We wish to draw the attention of *all* to this exhibition wherever offered to the public, and it is most desirable that the lecture be given in full, without mutilation, as has sometimes been the case, through unwarrantable censure. And we would here express the hope that *especial* occasion may be given to schools to attend this resume of Geology, as it gives more information in one hour than a pupil could acquire in many years from mere book study. The paintings are scientifically correct, and beautifully executed by eminent artists, and exceed anything of the kind which we have ever before seen in Europe.— *Dr. Carl Both.*

ELECTRICITY. — The French correspondent of a *British Jour.*, is responsible for the following story:— In the private apartments of the Emperor's palace, it is related that a lady in high position — in very high position, in fact — went near a mantlepiece, where she felt all of a sudden a slight commotion; she drew back naturally, and again approached — a new shock, and sharp prick. Illusion was impossible; however, she would try the experiment again. The commotion was increased in energy, and the prick became painful. Whatever was the matter? — and, calling several persons of her suite, she said, "Try, then," to one of them to whom she related the strange adventure. This lady allowed a slight cry of astonishment to escape her; for she, too, had felt the shock and the pricking. The grand lady then begged her husband to try. He, a little incredulous, but smiling, ventured to the magic mantlepiece. When he was within a few inches from the fireplace, a fine jet of bluish fire was seen to pass from the marble to his clothes. What was the mystery? They sent off to the Sorbonne for one of the professors — not as in old times; they would have called in a magician. M. Jamin, one of the finest ex-

perimenters ever seen at a lecture-table, posted off to the bewitched palace. The mantlepiece received him with showers of characteristic crackling sparks. "Ah! that is electricity," said M. Jamin, and in a few seconds he found the key to the mystery. Before the mantlepiece was a magnificent bear's skin; every time when any one walked upon it, the friction generated electricity, which manifested itself in its usual forms of sparks and shocks. M. Jamin rubbed the bearskin, and the sparks multiplied.

Earth Closets, and Earth Sewage, — is a work by George E. Waring, jr., published by the Tribune Association, 154 Nassau St., New York. 50cts. The author, in his usually clear and comprehensive style, gives a description, with illustrations, of the various applications of the earth closet, and of the devices which have been contrived for rendering this invention useful under different circumstances.

The present system of earth closets is based upon that of the Rev. Henry Moule, of England, who was the first to elaborate a plan for the systematic employment of earth for this purpose. This system has been most thoroughly tested in England, India, and more recently in this country, with the very best results. The attention of the public has been so extensively called to the merits of the earth closet, and the people so thoroughly aroused, that the time, we think, must soon come, when they will be completely satisfied of the superior advantages of this system over all others.

The Massachusetts State Board of Health, in their Report, say of it: "This is one of the simplest and yet one of the most useful discoveries of modern times."

How to travel for Health.— The best mode of travel is on foot or on a saddle; the next best, is in an open carriage, or in an old-fashioned stage coach. A sea voyage, and almost any mode of travelling by water, is, in general, useful; but it would be a serious practical joke if any one were to advise an invalid to seek for health in a railroad car.

A Life Insurance Policy has often proved a better medicine than a physicians' prescription, or a voyage beyond the seas. By setting the mind at rest relative to a provision for the family, it secured that great boon, called, in the Bible, "a merry heart," which is said to do "good like a medicine."

A Photographic Incident.— A farmer came into Paris one day last week, accompanied by his two sons, to get their photographs taken. To make the youngsters neat and trim for the *pose*, papa asked the artist to give them some water to wash off the dust of travelling. The photographer, being very busy, simply told them they would find a lavatory in the adjoining room, and the lads retired to polish up their faces.

Scarcely, however, were the negatives taken, when the countenances of the lads were observed to be gradually becoming of a dusky hue; and, finally, to the horror of their father, they became as black as crows. The photographer then divined the truth. They had plunged their heated faces into one of the chemical baths used for photographs. The wrath was great of their fond mamma when two niggers were brought back to her the same evening.

The loss of relish for mirth is a symptom of disease either of body or of mind; and where it is the result of the latter, it will be found to be due, in most cases, rather to evils engendered within, than to troubles that have come from without.

"There now," said a little girl, who was rummaging in a drawer, "gran'pa has gone to Heaven without his spectacles, an' you must take 'em with you, gran'ma, when *you* go."

The Most Fatal Form of Consumption. — The consumption of strong drink.

Medical Query. — When a person declares that "his brain is on fire," is it etiquette to blow it out?

Discretion in speech is more than eloquence.

A fine coat may cover a fool, but never conceals one.

Can a curl over the forehead be called "Locke on the Understanding?"

What Hope Did.— It stole on its pinions of snow to the bed of disease; and the sufferer's frown became a smile — the emblem of peace and endurance. It went to the house of mourning — and from the lips of sorrow there came sweet and cheerful songs. It laid its head on the arm of the poor, which was stretched forth at the command of unholy impulses, and saved him from disgrace and ruin. No hope, my good brother? Have it. Reckon it on your side. Wrestle with it, that it may not depart; it may repay your pains. Life is hard enough at best; but hope shall lead you over its mountains, and sustain thee amid its billows. Part with all beside, but keep thy hope.

Having had business transactions with the Union Mutual Life Ins. Co. for several years, during which we have always found them uniformly courteous, and honorable and upright in their dealings, we take pleasure in calling attention to their advertisement on last page of cover.— Ed.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

PREVENTABLE DISEASES.

THE great object of all physicians up to the end of the last century, and all the efforts of medical science, were devoted to one aim,— the discovery of a means of curing disease; to find a something, which, when employed by one ill of a fever, or an inflammation, should stop that fever or inflammation in its full career, and rapidly restore the patient to his usual health and strength. They sometimes imagined that they had discovered the specific, whether in blood-letting, or some other mode of treatment; but they were always compelled, in the end, to acknowledge, after long trial, that their specific had failed to cure; they were as unsuccessful, and as likely to be unsuccessful, as was the alchemist in his attempt to transmute the metals, or to discover the elixir of life. But a great change has now passed over the aim and object of the medical art; the cure of disease, once set above all others in importance, has sunk to a secondary place, and the first aim of medicine is nowadays to *prevent* disease. This great revolution was as important to medical science as the observations of Priestley were to chemistry, or Bacon's philosophical reform to the laws of thought. It was this that turned the whole stream of medical energy into the channel in which it now runs; till then, men had been content to accept disease as an inevitable affliction; they now began to understand that it was possible to prevent it, and from that time the energies of all the busy workers in every university and school of medicine in Europe, have been devoted to one aim — the extinction of disease.

Let it, then, be reiterated that the first aim of medicine is to prevent disease. The public have not yet learnt this, they still imagine that the only business of the doctor is to cure them when they are ill. In newspapers, the writers often blame the doctors for not having found out a cure for such and such a complaint, just then prevalent; they demand to be told, for example, the use of an art which cannot cure either the cattle-plague or the cholera. The answer to this is, that no one nowadays expects to find out a cure for these diseases; from what we know of their natural history, it seems probable that there never will be found out a cure. Further, much more could be done by what we even now know of the methods by which they can be suppressed, than if we could find out a method for curing one-half of the cases attacked. The popular ignorance on this subject was never brought out so completely as in the year of the cattle-plague in England, when the public for several months refused to listen to the only scientific and rational plan for its suppression, offered by Mr. Gamgee, but adopted instead the wildest and most absurd methods for its cure, suggested by persons who had not the slightest pretensions to knowledge on the subject. Had Mr. Gamgee's advice been acted upon in the early stage of the plague, England could be now many millions richer than it is. It is to be hoped that our readers will do their best to dispel the unscientific notions, prevalent amongst even well-educated people, as to the aim of medicine, for it is only by a wide diffusion of knowledge on this subject, that any attempt to check the progress of the immense amount of disease entirely pre-

ventable, whether by state interference or individual action, can be successful.

On referring to the English Registrar-General's reports for the last ten years, we find that in England and Wales about five hundred thousand people die every year; of which five hundred thousand, one hundred thousand die of zymotic diseases; that is, twenty out of every hundred people who die, die, usually at an early age, of disease which can, and ought to be prevented.

No approach to any means of curing these so-called zymotic diseases has been discovered; but of all the complaints known, they are the most easily preventable; in no other group of diseases is there a something which can almost be handled, which is the source of the complaint, and without which the complaint would not exist. It is to the entire removal of this cause that our efforts in the suppression of these diseases are directed. A knowledge of their natural history is necessary to a comprehension of the means to be employed in preventing their occurrence.

The diseases called zymotic — a name which is bad, because based upon a false theory, but which has become sanctioned from long use — are, in systematic medicine, known as the acute specific diseases; acute, because always of short duration, tending spontaneously to cease at a fixed date from the attack, and never extending over months and years, like chronic diseases; specific, because they are accompanied by a process peculiar to each one of the group, a process quite of its own kind, and unknown in the course of other acute complaints. Amongst them stand measles, scarlet fever, whooping-cough, diphtheria, mumps, typhoid fever, typhus fever, and small-pox. Measles may be regarded as a type of this class of complaints. It has a greater tendency to spare the life of the individual than most of the others; it is very widely distributed, and few people reach adult age without having suffered from an attack. The history of the complaint, and of those associated to it, is, therefore, personally interesting to almost every one.

Each disease, as a general rule, and only as a general rule, occurs but once during life. It not unfrequently happens, however, that a second attack of measles or small-pox occurs. Many years ago, a theory was propounded, referring the whole of the phenomena of these complaints to a species of fermentation. When the germs of the yeast-plant are introduced into a solution of sugar in water kept at a suitable temperature, the yeast-plant converts the sugar into two new compounds quite different from the original sugar, alchohol and carbonic acid. Nearly the same changes were believed to occur in the human body. Every child was supposed to be born with a variety of fermentable substances in his blood, in number equal, and corresponding, to every one of the zymotic diseases. These fermentable substances meeting with the germs of disease, were acted on by them exactly as the sugar is acted on by the yeast-plant; such a process going on in the body would naturally enough cause a feeling of illness; the fermentation was supposed to account for the fever, while the eruption on the skin was the means by which the products of the fermentation were thrown off. If the fermentation were completed, and the whole of the fermentable substance changed into new compounds, that accounted for the subsequent immunity of the patient, for, the whole of the fermentable substance, which was the food and sustenance of the disease, having been destroyed, no further attack could possibly occur. But if the fermentation had been incomplete, and the whole of the fermentable substance not destroyed, then the patient was still liable to a second attack, for he retained in his blood what might at any time be set off into new activity, if again encountered by the germs of the disease, and thus a second attack might occur. The theory explains a good many of the facts, but it demands too great a concession at the outset. Few will be disposed to admit the presence in the blood of nearly twenty distinct and separate substances, which exist only to serve as a nidus for the specific ferment, and to be a

source of injury to the individual. The name zymotic (leaven) still continues to be applied to this group of complaints.

Another striking feature in the natural history of these disorders is, that they are not known to arise spontaneously; their origin being always due to certain local causes. There is no properly authenticated case on record of a person having suffered from an acute specific disease, without personal contact with their sources, or with another person suffering from the same complaint. Recent discoveries seem to suggest that this contagious matter is a vegetable growth — a fungus. Some observers, especially in Germany, aver that they have been enabled to detect under the microscope the little plant which is the cause of cholera; others assert, that certain fungi found in mouldy straw will produce measles in less than forty-eight hours after inoculation. Sir Henry Holland has thrown out the idea that these diseases are produced by clouds of animalcules passing over a country; and he considers that the way in which an epidemic fever advances, supports this view. The zymotic theory has just been stated (fermentation). These opinions are introduced only to show how little is really known about the nature or composition of what is believed to be the contagious material;— of its form, whether animal or vegetable, whether a ferment, or simply some organic chemical combination, nothing is known. With regard to the mode in which this so-called contagious material is conveyed to individuals: it is a common idea that it is carried through the air, or even that it is produced anew where there are bad smells, defective drainage, and in low, damp situations. The notion that the air carries the contagious matter is singularly devoid of any support from the manner in which these complaints usually spread. When, for example, disease passes from one place to another, it moves along the line of traffic, not in the direction of the wind, but along the course taken by travellers; when a disease leaves a continent for an island, it makes its first appearance in a sea-port. In fact, the so-called contagious material seems capable of being carried but a very short distance, by the movement of the air; one of the best means of disinfection is to send a free current of air through the room or space, fresh air seeming to have the power of destroying or weakening, perhaps by dilution, the contagious material. There is no doubt that defective drainage, and crowding of people together, predispose to the reception of these specific complaints, and are themselves the direct causes of many and serious illnesses, but bad sanitary arrangements in a house or town do not usually generate these epidemic disorders, they being generally introduced from without; and then, under these bad sanitary conditions, they spread with frightful rapidity, and cause immense mortality. An instance in proof of this may be found in the hygienic condition of England before the time when the cholera first visited that country. Then the sanitary condition was probably as bad as could be, yet the cholera did not exist until it was carried over from the continent of Europe, when it spread rapidly and decimated the country.

What, then, is the way in which the contagious matter is conveyed? Chiefly by individual and personal contact, and by emanations from the sick man. . . .

In small-pox and measles, the specific process is the rash on the skin; in scarlatina, the rash on the skin, and the sore throat conjoined; while in diphtheria it is the sore throat alone, which is the specific process. The specific process itself is stricty local, never affecting all the tissues of the body generally, but limiting itself to one set of tissues, or to those analogous to it. Thus in small-pox, the local specific process is limited to the skin alone, except when it attacks, in grave cases, the mucous membrane, similar in structure to the skin, of the windpipe and air-tubes of the lungs. In diphtheria, the mucous membranes alone are involved, while in typhoid fever it is the adenoid tissue, which the spleen and some other organs largely contain, that

is affected. Fever is a constant accompaniment of the local specific process; and by fever we simply mean that the temperature of the body, as measured by the thermometer, is greater than in health. The natural temperature of the body is 98° Fah., but in fever it rises above this. The temperature of the body in health is maintained by a constant oxidation or burning of the tissues by the oxygen of the air, brought by the blood from the lungs. In fever, this process of combustion goes on more rapidly, and the tissues are burnt away at a higher rate, and thus an elevation of temperature is produced. A great increase in the products of combustion, which are eliminated from the system, takes place during the fever, or at its termination. This process of increased combustion readily explains the rapid emaciation which occurs in fevers. The great debility of the patient depends upon the exhaustion produced by the high temperature. According to Joule's law, every degree of increased temperature represents a certain amount of mechanical exertion. The Rev. Professor Haughton says: "The work due to animal heat would lift the body through a vertical height of eight miles per day; and it thus appears that an additional amount of work, equivalent to the body lifted through one mile per day, is spent in maintaining its temperature at fever heat. If you could place your fever patient at the bottom of a mine, twice the depth of the deepest mine in the duchy of Cornwall, and compel the wretched sufferer to climb its ladders into the open air, you would subject him to less torture from muscular exertion, than that which he undergoes at the hand of nature, as he lies before you, helpless, tossing, and delirious on his fever couch."

Both the local specific process, and the fever, have a tendency to terminate in the restoration of the sufferer to health, without any intervention of the medical art. But at the termination of these conditions a state of health, often wretchedly below par, is left behind. Scarlet fever frequently destroys the drum of the ear, by extension of the sore throat backwards into the Eustachian tube, and there sets up an ulceration by which the patient's life is in constant jeopardy; at any time, too, from the fading of the rash until a month afterward, that fatal form of dropsy, called scarlatinal dropsy, may supervene on the slightest exposure to cold. Measles, chicken-pox, and whooping cough, very slight in themselves, leave behind a predisposition to a most fatal complaint, the deposit of tubercles in every part of the body. In grown-up people, the brunt of the disease usually falls upon the lungs, and it is then called consumption; but in children the disease is spread more generally throughout the system, the brain and other organs suffering quite as much as the lungs. This disposition to tubercle arises after these three diseases, without any previous hereditary taint or inclination whatever. The zymotic diseases, then, are not the harmless ailments which the public think to be, but even the mildest may leave behind the seeds of a malady which, sooner or later, will destroy life.

The circumstances under which zymotic diseases are enabled to spread are the following. First of all, the zymotic principle itself (*whatever that is*), must be present; next, a condition of the atmosphere or of the surroundings, favorable to the spread of disease. Thirdly, personal contact, inoculation with, or inhalation of the emanations from the sick man. Lastly, an individual in a state of predisposed susceptivity, through previous modes of life or constitutional tendency.

Knowing that these four conditions are necessary for the spread of these diseases, the means at our disposal for their prevention will be shortly alluded to. With regard to the zymotic substance, the agent which most effectively destroys it, is heat. In Egypt, the spread of the plague is always arrested after St. John's day, from the intense heat which then arises. A temperature of 120° Fah. will prove a most perfect disenfectant in all cases. Several chemical agents are also said to be excellent disenfectants. Amongst these are especially to be mentioned

carbolic acid, chlorine, and nitrous acid. The state of the surroundings is very important, but unfortunately little is known of the meteorological changes which accompany an epidemic. A temperature of 32° Fah. seems to check the spread of some diseases, but the whole of our information on this point is most meagre. One of the surrounding conditions is known to be extremely important — fresh air—this is, without doubt, the most important agent that we possess in checking the progress of disease. Free, efficient ventilation of a house will often protect its inmates from infection from without. The media for the conveyance of disease have been spoken of previously. A predisposition on the part of the individual who is exposed, for not every one exposed is infected. Some persons seem quite incapable of receiving the zymotic diseases during the whole of their life; while, on the other hand, certain conditions of the system predispose to them; mental anxiety, worry, and trouble of any kind render a person peculiarly liable. So do fear of taking the complaint, a poor state of health at the time, great bodily fatigue and exhausting labor; above all, the fasting state. A person who has not eaten for hours will be far more likely, other conditions being equal, to be infected on exposure than one who has just taken a meal. We cannot always control our emotions or secure a tranquil and happy frame of mind; but at the worst, most of us can afford a dinner.

Amongst the poor, the want of good food and clothing, the indifferent light which does not allow them to see the dirt about them, and which they therefore do not remove, the overcrowding and bad ventilation, all render them exceedingly predisposed to the acute specific diseases. Accordingly we find that an outbreak of zymotic disease always makes head among the poor first; amongst them it gathers its strength and multiplies.

After a consideration of the preceding remarks, the question, "How may epidemic diseases be prevented?" may be more easily answered. Individual action can do little; it is to the State that we must look for efficient interference for the suppression of these complaints. Laws compelling the drainage and water supply to be at least effective, and forbidding the frightful overcrowding of dwellings which now prevails in every large town, ought to be made; every case of epidemic disease ought to be watched by officers of health, since that one case may become the centre of extension to the whole town.

Individuals may, however, do something in preventing these complaints, especially in their own households, but their exertions can scarcely reach beyond this. In the first place, let the water that is used for drinking be most carefully seen to *at all times*. No one should use water, the purity of whose source of supply is at all questioned, for water that looks, smells, and tastes perfectly good may convey the deadly poison of cholera or typhoid fever.

One of the most important means of prevention is also within the reach of individuals; it is quite simple, needing no apparatus or chemicals, and is the free and complete ventilation of all rooms and passages by means of windows opening on the external air, assisted, where there are opportunities, by fires in open grates. This method yields to none in efficiency; it is of far more use than any chemical means of disinfection, useful though these may be; the only effectual plan is complete and thorough ventilation.

The lives of cattle must be protected because they are valuable property; the lives of men are apparently of little or no account. So long as the poor remain in their present wretched and unhealthy condition — a very poor population may yet be healthy — and so long as the death rate exhibits little or no decline in each succeeding year, so long are we on the moral level of barbarians in disregard for human life. This deep stain on moral civilization, the entire neglect of the sanitary condition of the poor, can only be wiped away by a great effort on the part of society in general, by the framing of laws which shall effectually and at once remove this evil from amongst us.

HOUSEHOLD EDUCATION FOR WOMEN.

AMONGST the many questions that are being agitated concerning the proper forms of education for women, we must not lose sight of the great importance of instruction in the housekeeping, food, and cookery departments. There are many women who, while repudiating or ridiculing the necessity for a higher education in other matters, are no less scornfully ignorant of what ought to be a very important part of every woman's knowledge. There are other women again, who, in grasping earnestly the higher, lose sight of the lower, but not the less appropriate part of their education. When we consider this subject carefully, in relation to every woman's life, we find that in no instance can the knowledge of housekeeping and cookery be dispensed with. The only women — few and far between, in comparison with the number of other women — who *might* be able to dispense with this, are those who are so wealthy that they can afford the luxury of a housekeeper; but even these may be plunged into poverty some day, and then the requisite knowledge of practical things will not come badly to them. Besides, as no woman can be certain that she will be thrown into that particular sphere, it is well in early youth to accustom every woman to look upon life as a practical reality, — not to be dreamt away in idleness, and contempt of the lesser daily duties. This knowledge can be inculcated before the higher branches of education are reached, and it ought to form part of the programme of every girl's school, as well as of instruction at home. There would be ample time for it, for there are accomplishments which are insisted upon for girls, whether they have a talent for them or not; and they would be much better employed in acquiring more practical forms of education. It does not necessarily follow that, because a woman has a fair amount of practical knowledge, she must lose all feminine sweetness, and become a mere household drudge. On the contrary, the so-called household drudge seldom knows anything of the *science* of cookery and food. And this knowledge, far from interfering with higher education, in any form or phase, is a real necessity of that very movement for opening fresh employments, and for the more technical education of women.

First, we will suppose that a woman has been well educated, and that her lot in life is to be married, and that she is not one of the exceptionally wealthy ones. Will she not be the better wife for a knowledge of the physiological properties of food, and of the best mode of cooking the same? If she does not know what is the fault of the ill-cooked viand that her cook sends up to table, how is she to direct her to rectify it for the next time? And frequent repetitions of bad cookery are sure to put her husband in a bad temper, and perhaps drive him to his club, so that he may get a good dinner! He will most likely blame his wife for not being able to direct the cookery department more wisely. As a rule men care more than women do for good cookery; and, assuredly, it should not be considered beneath a wife to see that her husband's home is made happy, and that her household is well ordered in all things.

So then with a view to matrimony alone, every woman should be taught domestic management, and in her turn she ought to instil that knowledge into the minds of her daughters.

We will suppose, however, that a woman — and her name is Legion! — has no husband to please, or household to order, but that she is going to enter upon the medical profession, or to be hospital nurse, matron or superintendent of any public institution, a housekeeper, or a sister of mercy, or that she is going to emigrate to the West. Will she not require culinary knowledge for every one of these things?

First, as a physician, she must know what is good or not good for her patients; for, if she be anything of a successful practitioner, she will find

that diet is everything in many diseases. As a matron, superintendent or housekeeper, she must know how to direct the servants under her; and both in hospitals and schools the quality and mode of cookery of food is very important, and in many cases not sufficiently attended to. As a hospital nurse, she will not be the worse for practical knowledge of what she is administering to the patients; and, as a sister of mercy, it is equally important that she be qualified to instruct the poor whom she visits, for they might often be better and more wholesomely fed by the mere knowledge of how to utilize the small means they possess. And if a woman means to emigrate, it needs no argument to prove how idiotic she will be to undertake the life of a new settler, without that most necessary practical knowledge of domestic economy.

We see then that, in every station in life, the knowledge of the quality of food, and how to cook it, is very essential to womankind, — to enable them to make others happy and comfortable; by qualifying them to detect adulterations or bad qualities of food; and to prescribe the best food for sick people under their care.

It is a great cry of the age that servants are not up to their work, and it is mainly because so little trouble is taken to instruct them early in youth in the forms of service. It would indeed be a very good thing if our idle women would but undertake to instruct the poor in the practical duties of domestic life. Much illness and misery might be saved, and better servants secured to the community; and no woman should think it beneath her — be she as learned as any man living — to acquire a knowledge of the laws of health, and how that health is affected by good or bad food and cookery.

— Emily Faithful.

Technical Education. — It is on his mother's knee that the child, "eyes raised to heaven, and small hands folded fair," is taught to raise his voice to "Him who all things sees"; whilst walking at her side that he learns to turn his foot aside lest he should injure the worm, so marvellously made, and to watch the opening of the budding leaf; of her he asks, "What is the sun?" and to her he says, "Mother, what is there beyond the skies?" And she reads to him out of this fair book of Nature, and the instruction she gives him is wrapped in veneration for that Great Power whose law, by which all around is governed, is science; and the boy starts as a student, with the best of all incentives to the acquirement of knowledge — the love of inquiry.

Anxiety and Labor.—You cannot escape from anxiety and labor; it is the destiny of humanity. You may avoid indeed, to a great extent (some at least may), taking part in the struggle of life, in the sharp and eager competition of an open profession, or the not less intense pursuit of some worthy object of study. But, by what seems to me a just and wholesome retribution, those who shirk from facing trouble find that trouble comes to them. The indolent may contrive that he shall have less than his share of the world's work to do; but Nature, proportioning the instinct to the work, contrives that that little shall only the more weary him.

Sewer-water. — Dr. Frankland, in the *Brit. Med. Jour.*, denies the current notion that sewer-water, mixed with the stream of a river, is purified by the combustive action of the oxygen dissolved in the water. He maintains that there is no river in England long enough to effect this combustion completely and satisfactorily. It is true that, after a short distance, the river-water becomes limpid, and less loaded with organic matter; but that is because the greater part of the organic matter in suspension has fallen to the bottom, and is deposited with the mud. To purify sewer-water, he sees no other practicable means than filtration through the earth, which it serves to manure and enrich. This filtration completely purifies it.

HOW TO EAT.

ON this all-important subject many theories have been propounded, whole volumes written; and yet as often has the very point been missed which ought never to have been forgotten, viz., that we must listen to the voice of nature. In our present enlightened age of science, and spelling made easy, most of us know that one of the first receiving houses for food is a double-mouthed bag, lightly slung in the space below the end of the breast-bone, and called a stomach; that this bag is rather a complex structure, furnished with blood-vessels and glands, which keep it in working order, and with a set of nerves, which telegraph to the brain when the working is out of order. The middle and outer coats of this bag have some muscles handily interwoven, and these are more plentiful and stronger at the lower mouth of the bag, and act the part of doorkeeper, to prevent refractory morsels of food from bolting through the opening, as raw recruits for the bowels. Then, for the blood-vessels, — the very term implies the function; — and the glands, what are they for? To secrete juices which shall help to digest the food; while the nerves are the telegraphic system which permeates the whole structure, and signals very distinctly to the brain when blood-vessel, gland, or muscle, is failing to do its respective duty, or doing this duty inefficiently. If, then, we can bear in mind two great facts connected with the stomach, namely, — that it has, first, a set of blood-vessels, and therefore can be inflamed; and, secondly, that it has nerves, and therefore can be pained, — we may perhaps feel more disposed to be cautious in our treatment of the same. Luckily for us, it is a good stout bag, and will stand plenty of wear and tear; but the proverbial camel has its back broken by the last load, and the stoutest leather will occasionally give way, instead of stretching to circumstances; so, is it to be wondered at that the stomach sometimes strikes work?

My reader may ask, "How am I to tell whether this or that food agrees or disagrees with me?" I answer, "By your sensations." The nerves will telegraph the state of affairs. At first uneasiness, and then pain, will tell you whether the food you have taken has agreed, or the reverse. And, indeed, it *is* a question of agreement; you must come to terms with your stomach; for if you do not, it will eject the unwelcome lodger, or pinch and gripe you into submission. So that by listening in time to the warning given by pain and uneasiness, you may avoid the life-long trouble of indigestion.

I have spoken of the stomach individually as a separate organ, because it is perhaps more generally understood, if not more generally talked of; but we must not forget the part played by the bowels in the great drama of digestion. "Your stomach is out of order" is about the first sentence uttered by the medical man to his patient who shows him a furred tongue. Sir James Eyre has discoursed pleasantly and well on "The Stomach and its difficulties." "I have a weak stomach" is the complaint of the dyspeptic. It is, as I said before, a good, stout organ, and will bear much rough work; and it is well for us that Nature has so constructed it, for when so many bolt their food with little or no mastication, how necessary is it to have another set of teeth lower down, to reduce the precipitate morsels to that more harmless compound known as chyme. This is what the stomach does for us, — it remasticates our food, — only the teeth are replaced by certain juices, the constituents of which are a Babylonian mystery to physiologists. The stomach thus does the first hard work that has been shirked or slurred over by the teeth; and, though supplied so richly with blood-vessels, is rarely attacked by inflammation; showing that, after all, we must look to the poor neglected bowels for most of our digestive troubles. The remarkable example of the keeper of the Eddystone lighthouse off the coast of England only proves this

fact too plainly; for when that building was destroyed by fire in 1755, one of the men, on looking up at the burning mass, evidently with his mouth wide open (from astonishment no doubt), swallowed 7 oz. of the molten lead that fell from the top, and lived for ten days afterwards.

After such a case as this, what will not the stomach valiantly undertake? What has it not undertaken? Witness the fine collection of clasp knives in the Royal College of Surgeons' Museum, London, England, swallowed by an adventurous tar, endowed with more courage than sense. This human ostrich was in the habit of swallowing knives and tenpenny nails, partly from bravado, and partly from love of gain, for his messmates paid him for making these gastric experiments. However, one unfortunate afternoon he dined too freely on Sheffield cutlery, and paid the penalty of death for this unusual debauch. These are instances of the great endurance of the human stomach; but they are by no means examples for us to turn fire-eaters or Indian jugglers, but rather to warn us against making any rash trials of the powers of the stomach; for there is one little peculiarity about this organ, — that, after repeated attempts to stay the progress of a tough morsel, the valve which stops unlawful exports becomes weary, and passes the contraband wares through sheer fatigue. The consequence is, that the fragments which withstood the peptic machinery of the stomach not only defy, but wound the more delicate surface of the bowels. Pause then a moment before raising a tough, though tempting morsel to the mouth, and think of the journey it will undertake, when it has once fairly shot the rapids of the gullet, and got into the seething current of food that whirls and eddies in the great stomach lake below; and, as lighter craft glide safely over the Canadian rapids, so let your food morsel be light, and the transit will lose all danger.

Given, therefore, a stomach, strong yet sensitive, having a still voice like conscience, and bowels delicate and impressionable — is it not fair that Nature makes us suffer through these organs, when we insult her so grossly by irritating them with bad food, ill-cooked, half masticated, and wholly unfit for the purposes of nutrition? We deserve to suffer, and richly too. Sometimes we pour chemical compounds into the beautiful laboratory of Nature, and call them stimulants, but our chemistry is ill-applied. Stimulants they are in one sense, for they excite the coats of the stomach and bowels into a state of chronic inflammation. But this is not the whole sum of our folly. Barely satisfied with the mischief already worked by bad food and villanous drink, we crown all by vexing the unoffending liver, "more sinned against than sinning," with blue pill, and the already wounded bowels with black draught. Is it wonderful that we suffer? Is it surprising that we fall sick? How about that pain behind the shoulders, as if somebody had knocked you down with a paving stone; and that pain in the stomach, as if the same assailant had trampled on you when you were down? Did not that tough, leathery fragment, served as a steak, and chewed like rhinoceros hide, play some part in originating these pains? And did not the waiter, putting a decanter before you with an inky fluid in it, call it wine? Port wine I think he called it, and misquoted the year of its birth by a quarter of a century. And did you not pour this liquid fire over the inflammatory steak below, swallowed but not digested? And then, did you not, rushing wildly away to your office, bury yourself in your books? And was it a wonder that the devil of indigestion, the demon of dyspepsia, piped to his own?

This picture is by no means overdrawn. Hundreds of city merchants lead this spasmodic life for a few years, and then wonder that their stomachs are out of order. The wonder is, that their stomachs have kept *in* order so long. To those who say, "You have shown us how to get indigestion, but we want to cure it," I answer, "Do not talk about curing it, but rather ask how you shall prevent the same."

This will be the safer and the more satisfactory plan; for though it is a very good thing to go to a doctor (for the doctor), it is a much better thing to keep away from him (for the patient); and if you can learn this happy art, enjoying good health at the same time, you have discovered the true elixir of life.

To begin with, take your meals regularly: do not dine at 2 P.M. to-day, and 7 P.M. to-morrow, and 4 P.M. the day after; but fix some stated hour. Dining late is, as a rule, preferable to mid-day dinners, for dinner ought to be the principal meal of the day, and, to be enjoyed as well as digested, admits of neither hurry nor interference. The work of the day should be over; and a long rest, followed by light occupation before bed-time, will be singularly conducive to health as well as happiness. What profit or pleasure can you get out of a dinner when you know that an army of clerks awaits your supervision, or that some very tall and remarkably stout ledgers have to be balanced as soon as the cloth is removed? You wait with impatience for the courses to be served, for the food to be swallowed; but as for the digestion of the same, that is quite beyond your jurisdiction; your business is to clear so many dishes in a given time; your work is cut out before you, and you are not the man to shirk it. But you must consider that you have a stomach to superintend as well as clerks, and that if you do not give the bowels a passing thought, the balance will be dead against you in the ledger of health. Do not forget the good old adage, "After dinner rest awhile." Let your meals be considered as important an item in the business of the day as watching the firmness of foreign markets, the looseness of gray shirtings, or the fluctuating fortunes of the Mexican republic. If you are to ignore the art of dining, you may as well repudiate at once the art of living and working, for rest assured that, unless you dine with judgment, you will not be able to calculate with foresight; and, just for the lack of a little gastronomical knowledge, you may be a bankrupt.

Is there not the old story quoted by everybody who has written on food and digestion, namely, that the first Napoleon lost the battle of Leipsic from eating a badly-cooked mutton chop? He died of cancer of the stomach. I do not say that this was brought on by his hastily-snatched, half-masticated cutlets and chickens; but if we allow that a man has a predisposition to malignant disease, is it unlikely that the most ill-treated organ should be attacked by the disease? Be careful as to the character of your food — your imports let us call them; let them be nourishing, digestible, and judiciously cooked; for if these three qualities are combined, you will include a fourth, namely, that they shall be palatable. It is easy enough to tell you what is nourishing; those household words, beef and mutton, imply a multitude of dishes that shall nobly support life, and rarely fail to please the palate. Possibly you may reply, "That's nothing new; anybody could have told us to eat beef and mutton; we have been eating it all our lives." True, you have done so, but unconscious of its merits. It may be that you have been eating beef for forty years, and yet you may be even now profoundly ignorant of its full merits and capabilities. You have not always eaten it with judgment; you have eaten it tough, perhaps, or with the juices of the meat extracted, or with greasy accessories that do not harmonize with either the meat itself or the consumer thereof. Perhaps you have, with unflinching fidelity, stuck to the same joints, scorning any change to interest the stomach or stimulate the appetite; so that familiarity with these household words has bred contempt. Study variety, or let your cook do so, if she has brains (I do not write for those who keep a male *chef de cuisine*); if your cook lacks intelligence, let your wife come to the rescue; for, in common courtesy, we will admit that *she*, at any rate, is gifted with these organs of thought. There is a general idea prevalent that all beef is pretty much alike, more often tough than tender. But there are bullocks and bullocks, beef and beef, of varying qualities.

SIR J. Y. SIMPSON AND CHLOROFORM.

SIR JAMES Y. SIMPSON, the man who introduced the use of chloroform into medical practice, has just passed away. After a life of constant activity and industry, he has ceased from his labors; and perhaps it may interest our readers to hear something about the anæsthetic agent with which his name is so closely associated.

We need not attempt to explain fully the chemical composition of chloroform, or the processes by which it is obtained. These questions would carry us beyond the scope of a paper like this, and would involve us in topics of more interest to the chemist than to the general reader.

Sulphuric ether was the immediate predecessor of chloroform, and was the first vapor of the kind which was employed as an anæsthetic. Strange to say, though it was not generally used till 1846, its value had not been altogether unknown before that date. In isolated cases it was from time to time employed. One such instance is mentioned by Sir Thomas Watson in his "Principles and Practice of Physic." He writes, "A former patient of mine told me this story of herself. She had been sorely tried in her earlier years by paroxysms of dyspnœa frequently recurring, and her life was thought to be in danger. After fruitless trials of various other remedies, the following method was adopted with the happiest result: About two teaspoonfuls of sulphuric ether were poured into a saucer, which was placed on her lap, and over which she breathed as she sat gasping in bed, with a shawl thrown over her head to prevent the escape of the vapor. Very soon a delightful sensation of tranquillity ensued; she felt [I quote her own words] 'as if going to heaven the most heavenly way;' and presently she sank back unconscious. As soon as this happened her husband (the late distinguished admiral of the fleet, Sir T. Byam Martin), by whom the process was managed, withdrew the shawl, and in a short time Lady Martin gradually recovered, breathing calmly.

"This mode of quieting her attacks was begun in 1806, a few years after the publication of Sir Humphry Davy's hint; and it was repeated again and again, sometimes twice in the same day, for a very considerable period. Lady Martin survived the prediction of her speedy death for forty-three years."

It was natural to expect that the success which attended the inhalation of sulphuric ether should lead medical men to test the properties of other substances belonging to the same class.

Chloroform was discovered almost at the same time, 1831-2, by Guthrie in America, Soubeiran in France, and Liebig in Germany. Its exact chemical composition, however, was not ascertained till a few years later, 1834-5. It is most correctly described as consisting of three atoms of chlorine and one of formyle; hence its chemical name, terchloride of formyle. It is a clear, colorless fluid, heavy as compared with water, and very volatile. It has a strong etherial smell, and a very sweet taste. It is a powerful solvent, and acts rapidly on wax, resin, camphor, gutta percha, and other substances.

Chloroform may be obtained by various processes, but it is manufactured on a large scale by distilling, in definite proportions, chloride of lime (or common bleaching powder), alcohol, and water. It needs, however, to be thoroughly purified in order to render it fit for use in medical practice. It is of the utmost importance that it should be freed from all impurities, otherwise, when used for inhalation, it is apt to produce nausea, headache, and cough. It requires also to be kept with great care, for even the best is apt to undergo decomposition when it is exposed to light and heat.

In 1847 Dr. Simpson first experimented with chloroform. Its use was suggested to him by Mr. Waldie, of the Apothecaries' Hall, Liverpool. As is so often the case with great discoveries, that of the value of chloroform was made by accident. A saucer of

the fluid happened to be on the floor when a gentleman, accompanied by his dog, entered Mr. Waldie's room. When the visitor was about to leave, the dog was found near the saucer, stretched on the floor apparently lifeless, but after a few minutes it recovered consciousness, and became once more lively and active.

This incident was not lost upon the sagacious chemist. He immediately made experiments upon various animals, and soon after he had an opportunity of calling Dr. Simpson's attention to the facts he had observed.

That learned physician at once perceived the importance of the discovery, and without delay began to experiment upon himself and others. The result of his investigations was made public in November, 1847, and immediately commanded wide-spread interest and attention. Medical men everywhere took up the subject, and in the course of a very few months, the value of chloroform had been tried in every quarter of the globe.

From what we have said it will be seen that the credit due to Dr. Simpson is not that of having made a discovery, but of having conferred a still greater benefit on humanity by the application of known facts to the wants of mankind. He did not discover the gold mine, but he followed up the vein, worked the precious metal, brought it to the surface, and converted it into current coin. Chloroform had been known, as we have seen, since 1831, but for fifteen years it had remained on the shelf of the laboratory as little more than a chemical curiosity. Waldie had noticed its anæsthetic properties, but it was Simpson who first had the courage to inhale it himself, and then, by more extended trials, to ascertain the conditions under which it might be properly administered to different classes of patients, and be made available for the relief of human suffering.

The Queen of England was pleased to confer a baronetcy on Dr. Simpson, as a tribute to his genius and a mark of the nation's gratitude.

At first chloroform was thought to be a safer as well as a more convenient agent than ether, but experience soon modified this impression, and it became apparent that equal caution must be observed in its use.

The mode of inhalation which was recommended by Simpson, and which has been generally practised in Scotland, is to sprinkle a small quantity of the fluid on a handkerchief, and to hold it over the patient's face. This method has its advantages. It is simple, it causes no discomfort, and the patient is not alarmed by the sight of any strange apparatus, a point of no small moment, especially in dealing with children. But it has also its drawbacks. It is an expensive method, for much of the fluid must be wasted; but, what is of still more importance, the amount of the chloroform vapor administered is not regulated by any certain measure, and it is impossible to tell, from moment to moment, in what per centage the anæsthetic is blended with the air which the patient is breathing.

Hence a variety of "inhalers." have been invented, and much ingenuity has been expended on their construction. In all of them the chief object in view has been to provide that a certain proportion, and not more than a certain proportion, of chloroform vapor is mixed with the air which is being drawn into the lungs. For while a small proportion is free from danger, and produces its effect without irritating the patient, a larger amount might be prejudicial. For these reasons an inhaler of some kind is used in most of the London hospitals.

No one has yet been met with who can resist the influence of chloroform altogether, but the way in which it affects different individuals varies considerably. Some fall asleep quietly, some become talkative and noisy, some get violent, and even pugnacious. But after the lapse of a few minutes, when a full effect has been produced, all alike fall into a deep sleep. As a rule the upper classes take it more quietly than the lower. The influence of education is here very apparent. Those who are accustomed to discipline themselves, are quiet even when they become unconscious; while those who

are intemperate and ungoverned, lose all self-control as soon as their consciousness begins to forsake them. Thus it happens that we meet with all varieties of behavior in people who are under the influence of anæsthetics; some sleep quietly, some snore, some chatter, some sing, some pray, some swear, some struggle, some fight.

The most touching incident we have ever seen, was in the case of a girl, the daughter of a clergyman. Her father was very poor, and, as her case was one which required two successive operations, she was admitted into a hospital. She was a small, slight, delicate girl of about seventeen. Her eyesight was so much impaired that she could hardly see at all. But I doubt not she had been well brought up, and that the care which had been bestowed on her had not been in vain, for it was easy to see in what direction her thoughts turned, and where she found her resting-place. When she was under the influence of chloroform she prayed and sung.

It was a striking and touching scene, the poor, delicate, sightless girl lying on the couch, surrounded by a group of surgeons and students.

On the occasion of the second operation, when she had again to take chloroform, she behaved in exactly the same manner.

But though as a general rule patients fall rapidly and certainly under the influence of chloroform, yet unhappily accidents occur, every now and then, which remind us that it is not without its dangers. It is not easy to estimate the risk which the patient incurs, and it has been variously stated. In any case it is very small. Perhaps we should not be far from the truth if we said that there was not more than one fatal case in two thousand.

Undoubtedly the use of chloroform has introduced a fresh, though a very slight risk into medical and surgical practice. But, on the other hand, it must be remembered that before the days of chloroform patients sometimes died from the actual pain and shock of the operation, following, as it often did, upon a period of anxiety and dread. Both these sources of danger are now, in a great degree, removed. The patient knows that he will be unconscious of suffering, hence his apprehensions of the operation are greatly lessened, while the actual pain is altogether removed. Thus any evil effects that chloroform may occasionally produce are much more than counterbalanced by the benefits it confers. It would be as unreasonable to condemn the use of anæsthetics on account of the slight risk which is inseparable from them, as it would be to desire to abolish railroads because of occasional accidents; while, on the other hand, chloroform has added so much to the resources of the surgeon that the number of successful operations has multiplied greatly, just as travellers are now far more numerous, since the introduction of steam communication, than they were in the old coaching days.

If we examine those unfortunate cases in which persons have died while under the influence of chloroform, it will be found that some, at least, may be traced to the ignorance or carelessness of incompetent administrators. If it were always given under proper advice, and by an experienced hand, the number of accidents would, no doubt, be reduced. There seems every reason to hope that the progress of chemistry will ultimately furnish us with an agent that shall have all the advantages of chloroform and none of its disadvantages.

In this country, where, as we have seen, the modern anæsthetics had their origin, ether still holds its ground, because it is considered a safer agent than chloroform. Fewer casualties have probably occurred from its use, but, on the other hand, it has its own especial drawbacks. A greater quantity has to be given, and the inhalation is protracted over a longer period. It is very apt to produce headache, nausea, and sickness, and these disagreeable symptoms often continue for a day or two. For these reasons it has fallen into disuse in England, and has given place to chloroform, which is much less frequently followed by these symptoms, and which produces its effect more rap-

idly. In fact, we prefer chloroform to ether from much the same kind of reason as that which induces us to travel by an express rather than by an accommodation train.

While we are speaking on this subject, it may be well to inquire whether there are any cases in which the use of chloroform is specially dangerous. The popular notion is, that whenever anything is wrong with the heart it is unsafe to take chloroform. This is very far from being the case. When a fatal accident has occurred it has often been found impossible to detect any tendency to disease in the patient, though occasionally the fatal result has been traced to a weak and degenerate heart. But, on the other hand, persons suffering from confirmed disease of the heart, or other important organs, as a rule seem to take chloroform as well as others, and to suffer no ill effect. In such cases there may, perhaps, be need of increased caution in the administration, but there is no reason at all why the patient should be debarred from the relief which it confers. Hence it arises that the broad practical rule which governs surgeons is this, that if the sufferer is well enough to undergo an operation at all, he is well enough to avail himself of the anæsthetic. Therefore our answer is, that the cases are quite exceptional in which chloroform ought to be withheld, and that none need disturb themselves with the thought that they must not have recourse to it.

It seems strange that the use of chloroform should ever have met with any opposition. Looking back from our present standing-point, it is difficult to understand the controversy which at one time raged upon the subject.

Letters were written, pamphlets were published, to prove that pain was a part of the curse inflicted upon man at the fall, and that it was sinful to attempt to escape it.

In reply to this, letters were written, pamphlets were published, to show that pain is only one of the evils attendant on our fallen state, and that man is at perfect liberty to lighten his burden, as he best can, by the use of any means which God has put within his reach.

This controversy has now almost, if not quite, subsided in England, and from the highest ranks to the lowest, from the Queen to the poor hospital patient, all classes are willing, and even anxious, to avail themselves of the relief afforded by anæsthetics. Indeed, it sometimes happens that the patient insists upon having chloroform when the surgeon sees no sufficient reason for recommending it. Though the risk in any case is very trifling, yet it should always be remembered that there *is* a risk, and it hardly seems right to incur even this small amount of danger, when a moment's fortitude on the part of the patient will enable him to bear all that has to be done.

But the removal of pain is by no means the only advantage which we owe to chloroform. If it enables men to bear better the suffering which is inevitable, it also enables the surgeon to do far more than he could do without it. Its introduction has marked an era, not only in the history of medicine, but also in the progress of surgery. Many operations are now undertaken, and successfully performed, which would hardly have been attempted thirty years ago. We may mention, for example, some of the delicate operations upon the eye, where it is of the utmost importance that the patient should be perfectly still, and few persons have sufficient self-control to remain motionless under such trying circumstances.

Enough has been said to show the value of chloroform, and the claims which Sir James Simpson has upon our gratitude. Though he was not the discoverer, yet to him belongs the credit of having been the first to apply it to medical and surgical practice. It is no wonder, then, that he should have been regarded as a public benefactor, and that the news of his death should have been received with profound regret.

His name will be handed down to future ages along with those of Harvey, and of others whose lives mark an epoch in medical science. The discovery of the anæsthetic properties of chloroform is a blessing which is not

confined to any single period of the world's history, or to any one section of mankind; but wherever and whenever there is pain and suffering, — that is to say, as widely as the human race is scattered, and as long as it endures on the face of the earth, — its value will be appreciated. It is possible, as we have said, that at some future time a still better anæsthetic may be discovered; but, even if this happy result be obtained, chloroform will always be remembered as a signal example of the successful efforts made to diminish human suffering, and of the victory of science over physical evil.

INFANT MORTALITY IN FRANCE.— A report has just been presented to the Academy of Medicine by a commission appointed to examine into the causes of, and remedies for, the excessive mortality among infants in France, from which we extract the following: The causes of the great mortality among newly-born children may be referred to the following categories: 1. Misery, which is so often the cause of congenital weakness in infants. 2. The abandonment, sometimes unavoidable, but very often voluntary and unjustifiable, of lactation by the mother. 3. Ignorance of the most elementary rules of diet and physical training in infancy, and the prejudices of all kinds which arise from this ignorance. 4. The abuse (unfortunately too prevalent) of artificial lactation, always inferior to maternal lactation, and the difficulties in the application of which almost always produce danger. 5. Too early feeding; this must not be confounded with artificial lactation, though the two are often associated. 6. Want of necessary hygienic care; and, especially, the chilling to which infants are too often subjected while being carried about. 7. The want of medical care at the commencement of illness. 8. The want of a regular *surveillance* and medical inspection, in regard both to the regular supply of nurses, and to the care to be taken of the children. 9. The carelessness and culpable indifference of parents with regard to their children who are sent out to be nursed. 10. The large number of illegitimate births. 11. The more or less criminal proceedings which constitute the masked varieties of infanticide. The remedies are arranged under the following heads: 1. To prevent misery, all means of amending the physical and moral condition of the people should be put in force. 2. To combat the other causes, maternal lactation should be favored as much as possible, by increasing the number of sources of temporary assistance granted to poor women who are able to suckle their children, and the feeling of maternal duty aroused in the more fortunate mothers. 3. Sound hygienic principles and rules, especially as regards the feeding of infants, should be extensively diffused. 4. The administrative and medical *surveillance* of infants sent into the country to be nursed should be rendered more effectual. 5. A more extended distribution of infants put out to nurse should be encouraged. 6. The occupation of nurses should be subjected to regulations based on medical data, in conformity with the plan proposed by the commission. 7. Rewards should be established for devoted and meritorious nurses. Cases of notorious want of care should be followed up, and brought within the category of homicide by imprudence in cases where death occurs; and those women should be considered guilty of voluntary homicide who cause the gradual death of the infants abandoned to them. 8. A permanent commission, under the title of Commission on Infantile Hygiene, should be instituted in the Academy of Medicine; to which should be sent documents referring to the hygiene of infants and the inspection of nurses. Like the other permanent commissions, this one should propose annual rewards, with the sanction of the government. The report is to be forthwith discussed in the Academy.—*Brit. Med. Jour.*

THE pleasant odor emitted by fir trees in a sunny atmosphere has long been thought serviceable to invalids, and the vicinity of pine woods has been deemed salubrious.

Do not take medicines when you are well.

ON POISONS.

BY F. S. BARFF, M.A.

Fourth Paper.

OF all the benefits to be derived from a more extended knowledge of chemistry, one can hardly conceive a greater than the influence which it must have on the affairs of common life. We constantly use materials, which may, from want of caution, cause serious evils, if not endanger life. Substances are used in the preparation of food, and even in its adulteration, which are extremely deleterious. A knowledge of the properties of these substances, and how they may be employed without danger, and under what circumstances they become dangerous, is of the utmost importance. If persons generally could by simple processes detect certain adulterations in articles of food, they would cease to be used, for the fear of detection would render their employment very hazardous to the adulterator. A person who uses copper cooking vessels, knows that cleanliness is absolutely necessary, but he does not know that other precautions besides this must be taken to prevent the food cooked in them from becoming impregnated with copper. Copper is not what chemists call an active metal. If copper be put in a solution of hydric-chloride, from which the air has been expelled by boiling, so that no oxygen be present, and if the bottle in which it is placed be carefully corked so as to exclude air, the copper will remain unchanged for some time; slowly, however, it will become dissolved, that is, it will replace the hydrogen in the hydric-chloride and form a green liquid called cupric-chloride, the hydrogen gas being set free. Hydric-chloride is formed of one part by weight of hydrogen, and thirty-five and a half parts of chlorine; sixty-three and a half parts by weight of copper replace the one part by weight of hydrogen, so that ninety-nine parts of cupric-chloride are formed,—if the experiment be performed in the same way; but if the vessel containing the copper and hydric-chloride be left open, then the action will be much more rapid; the liquid will become green in a very short time, showing that the presence of air facilitates the combination of the copper and chlorine. In the acid liquid, in the presence of air, or free oxygen, the copper becomes oxidized, or converted into oxide, and the oxide is rapidly acted upon by the hydric-chloride—the hydrogen of which is not now set free, but unites with the oxygen of the cupric-oxide. If a small quantity of the black oxide of copper be put into a vessel with hydric-chloride, a green liquid is immediately obtained. These experiments are easily performed, and well illustrate the value of chemical knowledge, for they explain under what ordinary circumstances danger may arise from the use of copper cooking vessels. Cold water absorbs gases, in various proportions according to their solubility; this is seen in the case of a bottle of soda water. Under pressure the water holds in solution a large quantity of a gas, called carbonic acid, which escapes in part when the cork is removed; but after the soda water has got what is called flat, if it be warmed, bubbles of gas will be seen to rise to the surface, and a volume of carbonic acid, about equal to the volume of the water, may be obtained with care. Water dissolves about three per cent. of oxygen, at the ordinary temperature of the air, but when boiled all the oxygen is expelled. When, then, a liquid containing an acid substance, which will dissolve oxide of copper, is boiled in a copper vessel, if no free oxygen be present, no oxide will be formed; but if the liquid be allowed to cool it absorbs oxygen from the air, and oxide is formed, which is dissolved by the acid liquid. In a case mentioned in the last article, (July No., page 63,) a woman and her daughter were poisoned by eating sour krout; but the sour krout had been allowed to get cool and stand for two hours in the copper vessel, here the copper became oxidized during the two hours, and was

dissolved by the acid of the cabbage. Whenever acid substances are boiled in copper vessels, at the junction of the surface of the liquid with the vessel, some oxide of copper must be formed and dissolved. German silver, of which spoons and forks are made, which is an alloy of copper, zinc, and nickel, containing nearly half its weight of copper, should be used with caution. A case is recorded of a lady who, after partaking of eels at dinner, was seized with headache, nausea, vomiting, and colic. The eels, of which she had eaten, had been cooked in an earthen vessel with butter and vinegar, a spoon had been used and left standing in the compound; the spoon was of German silver. On analysis it was found that some of the copper in the spoon had been dissolved, and had got mixed with the food; the spoon was well cleaned, and placed in a hot mixture of bread, butter, and vinegar; half an hour after the mixture had got cold, green spots were seen on it, and in twelve hours the spoon was quite green, as well as the butter in contact with it. Not long ago, copper was largely employed to give a green color to pickles. One would fear that the practice was not altogether discontinued, from the fact that some manufacturers find it necessary to state on their labels that their pickles are free from copper. From what has already been said, it is easy to conceive that copper may be present in pickles without being placed in them fraudulently, if copper vessels are used in their preparation. It is almost impossible to conceive how, under such circumstances, copper can be entirely absent, and the quantity must depend on the care taken by the workmen. It is most desirable that all pickles should be tested before being used. On the continent, some few years ago, it was discovered that a salt of copper was used in making bread, to assist the process of fermentation. When employed in small quantities it is said to make the bread much lighter, and of a very white color. In larger quantities its presence could be detected, by the bluish color it imparts to the bread.

In 1829 and 1830 the Belgian Government employed M. Barruel, M. Gauthier, M. Claubery, and M. Kuhlmann, to investigate a report that sulphate of copper was mixed with the bread in Bruges. They discovered that in 1816 and 1817, this salt of copper, under the name of alum-blue, was first employed by the bakers to raise their bread; and had since been employed very generally. Bread made in this manner was examined, and small pieces of crystallized sulphate of copper were found in it; when this was the case, the bread had a blue tinge. On chemical analysis copper was readily detected. Foreign syrups are also sometimes adulterated with copper. Sulphate of copper is used to decolorize the common sugar of which they are made. The copper is precipitated by lime from the syrup; but this is not always completely done, and some of the copper salt remains behind undecomposed. These syrups have sometimes been the cause of serious consequences to those who have partaken of them.

Sulphate of copper is used in medicine, sometimes as an emetic; for this purpose it is found useful where narcotic poisons have been taken. Externally, both the sulphate and nitrate of copper act as escharotics. In solution the sulphate has styptic properties, and is useful in stopping hemorrhage. But care is necessary in its external application. Animals have been killed when it has been applied externally. Dr. Duncan killed a dog in twenty-four hours by applying sulphate of copper to a wound.

The symptoms produced by poisonous doses of soluble copper salts are very similar to those produced by arsenic and corrosive sublimate; there are, however, differences which will be noticed presently. In copper, as in arsenical poisoning, there are local and remote symptoms. The local are produced by the irritating effects of this escharotic substance. Like arsenic, copper salts seem to adhere to the mucous surfaces and set up inflammatory action. When death takes place slowly, these appearances are more marked. That copper is taken up by the blood, has been proved by experiments on an-

imals, and when acting through this medium on the system, the heart's action is interfered with — it loses its contractile power, and after death, red blood is found in its cavities. Difficulty of breathing, palsy of the lower extremities, tetanic spasms, and a general derangement of the nervous system are the results of its introduction into the circulation. When two grains of verdigris dissolved in water were injected into the jugular vein of a dog, they caused vomiting in seven minutes, then rattling in the throat, and in half an hour death. There were no particular morbid appearances found in the body after death. Half a grain killed a dog in four days; and in addition to the preceding symptoms, there was palsy of the hind legs for a day before death. Six grains of sulphate of copper, introduced into the stomach, killed a dog without producing any appearance of inflammation. The symptoms which peculiarly characterize poisoning by copper salts, and which distinguish its effects from those of other irritant poisons, are the peculiar taste of the metal, which persists, even after the person is out danger, and in jaundice, which is often induced by over doses of copper salts. A case is given by Doctor Christison illustrative of the slighter forms of poisoning with copper. Two women and two young men ate of an acid confection made in a copper vessel. The two women suffered from severe headache, constriction of the throat, nausea, colic, and extreme weakness. The young men, who had eaten more freely of the confection, had for some hours excruciating colic, severe pain in the mouth and throat, impeded breathing, and hurried irregular pulse; and for twenty-four hours they suffered severely from headache and prostration of strength. The matters ejected from the stomach are often of a green or bluish color, and sometimes this tint is communicated to the skin, especially about the eyes. After death the skin is often yellow, and the internal parts exhibit the effects of an irritant poison in a marked degree. Sometimes the action has been so violent as to cause perforation of the intestines. Very frequently masses of green matter are found, owing to the presence of particles of copper salts. The best treatment that can be employed is, after using the stomach-pump, to administer soothing drinks. Albumen (white of egg) forms insoluble compounds with the salts of copper, and is therefore recommended as an antidote. It must, however, be given in large doses.

The results of experiments performed on animals are by no means satisfactory, and it will be seen presently, that the conditions under which the red oxide of copper is formed, are not very likely to exist in the stomach of an animal. Metallic iron is, doubtless, a good antidote; the iron precipitates copper as metal from its solutions, and, as metal, it is harmless. The iron should be administered in the form of filings. Care should be taken not to administer acids, as they dissolve the compounds which copper salts form with organic substances. The analysis for copper is easy, unless it exist in the form of organic compounds. Copper salts, as they are usually presented to us, are either blue or green in color, and are usually prepared by dissolving the oxide in hydrogen salts. As has been already stated, the metal is but slightly soluble in hydric chloride, and dissolves but slowly in hydric sulphate. The red color and peculiar disagreeable smell of copper is familiar to all. It is soft and ductile; and from the ease with which it can be worked, and from its chemical properties, it and its compounds are largely used in arts and manufactures. Metallic copper is precipitated from solutions of its salts by iron. Cementation, in the metallurgy of copper, is the application of this process to the extraction of the metal from its ores. Very minute traces of copper can be detected in solutions by its reduction by iron. Suppose any substance, say for instance some ordinary pickles, are thought to contain copper, if a few bright needles be placed in some of the contents of the bottle containing them, if copper be present, it will be precipitated on the needles, and will coat them with a thin film of that metal. If the needles be carefully

dried by blotting paper, and placed in an open vessel containing ammonia solution, the copper will be gradually oxidized and dissolved by the ammonia, and the liquid will acquire a blue tint, which will be deep or light in proportion to the quantity of copper present. This is an experiment which can be very easily performed, and will never fail to detect copper, if it be present in quantities sufficiently large to be injurious to health. Copper forms two compounds with oxygen, one, in which sixty-three and a half parts of it by weight unite with sixteen of oxygen. This substance is a black powder usually obtained by heating the nitrate until red fumes cease to be given off. It is also formed when copper is heated in air or oxygen.

The rust of copper is not oxide, but a green basic carbonate; it is this which gives the beautiful color to ancient bronzes. Copper does not oxidize in moist air, nor is it able to take the oxygen from steam. A current of dry hydrogen passed over its oxide, when at a red heat, deprives it of its oxygen, water being formed, and pure metallic copper being left. If this finely divided copper be heated in air it burns readily, and in this way it is used as a means of taking oxygen from its mixture with nitrogen, in an analysis of atmospheric air. If black oxide of copper be melted with glass, it imparts to it a beautiful green color, and is for this purpose largely employed in the manufacture of colored glasses. When a solution of caustic potash is added to a solution of cupric sulphate, a bluish green precipitate is thrown down, which is the hydrated oxide of copper; excess of potash does not dissolve it. On boiling the mixture, the blue precipitate becomes black, it ceases to be the *hydrated* oxide, and becomes the black oxide of copper. It is strange that, in the presence of water, cupric hydrate should become de-hydrated. The action of a solution of ammonia on copper salts is at first similar to that of caustic potash; a blue hydrate is precipitated by it; but when added in excess, the precipitate is dissolved, and a clear transparent deep blue solution is formed. This action of ammonia is made use of in testing for copper. If a few drops of a very dilute solution of cupric sulphate be dropped on white paper and dried, they will hardly discolor it at all; but when a solution of ammonia is applied, they will directly become visible, and of a blue color. A colorless liquid will immediately acquire a blue tint on the addition of ammonia if it contain a cupric salt. This test taken alone might mislead the analyist — as nickel salts behave in a similar manner when treated by ammonia. It requires, however, much more of a nickel than of a copper salt, to produce a blue of the same depth; the nickel blue is also more violet in color. The toxicologist would find no difficulty in distinguishing between the two, the precipitation of the metal copper on iron, the ferrocyanide reaction, which will be described immediately, together with its behavior with potassic cyanide, sufficiently indicate the difference between copper and nickel, to prevent any mistake arising in an analysis, if due caution be used. The most delicate test for copper is the ferrocyanide of potassium; it gives a brown precipitate; or if the quantity of copper salt present be very minute indeed, a brown discoloration in acid solutions, the precipitate is said to be dissolved by ammonia. Copper chemically combined with arsenic, as cupric arsenite, is largely employed as a pigment; it is that beautifully bright green which is used in room papers. If a few drops of ammonia be placed on a piece of such paper, the green will be changed to blue by the ammonia, and the presence of copper being thus proved, that of arsenic may be fairly inferred. In analyzing for copper, it is always usual to pass sulphuretted hydrogen gas through the liquid; when this is done a brown sulphide is deposited. After the sulphide is washed, it is dissolved in hydric nitrate; and here the blue color of cupric salts shows itself at once, or is made apparent on the addition of ammonia. The compounds of copper which are usually met with, are the basic acetate or artificial verdigris. The copper in this salt may be found by the processes

already described, and the acetate may be discovered by its odor, or with greater certainty by heating the salt with alcohol and hydric sulphate, when acetic ether will be set free, which is known by its peculiar and agreeable smell.

The carbonate of copper, a basic-salt, which is formed by the action of moist air on metallic copper, and which is found native as malachite, when treated with hydric chloride is dissolved; the effervescence which occurs indicates the presence of carbonic acid, which may be confirmed by the white precipitate obtained, if the gas be passed into lime water. The sulphate of copper, called also blue vitriol and blue-stone, has been already described; the presence of the sulphate may be determined by the white precipitate which is thrown down from its solution by basic chloride, which precipitate is insoluble in hydric nitrate, and in hydric chloride. Nitrate of copper is a salt whose crystals have a deep blue color; they are extremely deliquescent. Cupric chloride is green; it is very soluble in water. These are the most important salts of copper which have been, or might be, used as poisons, and in each one of them the method of testing for that metal is the same as that already described. There are, however, compounds of copper which, although they are not likely to be used as poisons, are of sufficient interest to deserve a brief notice here. When freshly precipitated cupric hydrate is treated with ammonia, it is dissolved, and a deep blue liquid is formed which has the property of dissolving woody fibre. If some clean cotton-wool — which is the purest form of woody fibre — be shaken up with this ammoniacal solution of cupric hydrate, it is slowly dissolved, and can be again precipitated as a gelatinous mass by the addition, to neutralization, of hydric chloride. The salts only of the higher oxide of copper have hitherto been noticed: there is a lower oxide of copper, which is composed of one hundred and twenty-seven parts by weight of copper to sixteen parts of oxygen. This oxide is of a reddish-brown color, and its principal use is in glass-making. It produces the beautiful ruby color, so well known in stained glass windows. The salts of this oxide are not blue, but white: cupreous chloride is a white solid, insoluble in water, but soluble in hydric chloride. By decomposing cupreous chloride with potash, the red oxide may be obtained; but the more ready way is to precipitate it from an alkaline solution, containing cupric oxide, by means of grape sugar. The presence of organic matter in a solution of cupric sulphate, prevents the precipitation of cupric hydrate by potash; but if grape sugar be boiled with the mixture, the higher oxide is reduced to the lower, which is precipitated. Grape sugar exists naturally in many fruits; it is found crystallized in raisins, but it can be prepared by boiling common cane sugar with dilute hydric sulphate. It acts as a reducing agent, taking oxygen from bodies which do not hold it combined too strongly. Now these reactions are extremely interesting, as bearing upon a matter which has already been alluded to. Sugar has been considered an antidote for copper, inasmuch as it causes its precipitation as the red oxide. The sugar which produces this effect is grape sugar, not cane sugar, which has no such action, and the circumstances under which grape sugar does it are not such as are likely to exist in the human stomach. Again, the fact that cupric oxide is not precipitated by potash in the presence of organic matter is also important, as it shows that unless organic matter be destroyed, copper cannot be discovered unless it be in excess of the organic matter present. Cupreous hydrate is like cupric hydrate, soluble in ammonia, but its solution is colorless, not blue; when, however, it is exposed to free oxygen, for ever so short a time, the lower oxide becomes oxidized into the higher, and a blue color appears; this solution, therefore, is a most excellent test for free oxygen. When cupric salts are heated, so as to drive off their water of crystallization, they become white, and in this condition they rapidly take up moisture, and become blue again. This property is often made use of in the laboratory for taking water from alcohol.

HOW TO VENTILATE A SICK-ROOM.

BY ROBERT WHITE, JR., M.D., BOSTON.

VENTILATION is a subject on which much has been written and said, yet but few people have any clear or definite ideas about ventilating rooms which are in constant daily use. The general idea seems to be that all "systems of ventilation" are complicated and expensive, and to be made available only by a great outlay of time and money, and but few believe that good ventilation can be secured in *any* house that has doors and windows, merely by the exercise of judgment, and "knowing how to do it." Among all classes of people there is a great want of knowledge of the first principles of the rules that govern ventilation, and this ignorance is an obstacle that the physician meets daily — almost hourly — in his practice in a large city; and he is obliged to combat it, and to enlighten people on what is necessary to be done to secure proper ventilation for his patient, and sometimes this escapes the attention of the physician even, or his instructions are not sufficiently clear, and consequently fail of their desired effect. That the best ventilation to be secured is desirable, nobody denies; but how to get it in houses of ordinary construction at short notice, without great expense or labor, is the question which I will try to answer.—There are certain general rules governing all modes of ventilation which we will here state: First, in regard to the *necessity* of ventilation. This is usually admitted, yet there are many who are ignorant of it, or have a very imperfect idea of *why* it is required; so for the benefit of those who do not know, we will try to show why ventilation is necessary. Pure air is composed largely of oxygen, without which animal life cannot be sustained, therefore this air is appropriated by the human body — entering it by the lungs; so that every breath drawn by a person robs the air immediately surrounding him of a portion of its vital principles, and every time the breath passes *from* the lungs it is loaded with carbonic acid gas, and other matters, the products of the waste of the body, more or less poisonous according to the amount contained in the air, so that every time this process of inspiration and expiration is performed, (some twenty times a minute in health, and much oftener in some diseases,) the air is not only deprived of its healthy principles, but poisonous matters are added to it. It is not merely the presence of carbonic acid gas in the air that renders it unhealthy, but the exhalations from the human body still further deteriorate it. As an illustration we will take the perspiration, some two or three pints of which are discharged from the surface of a healthy body in the course of twenty-four hours, and in very warm weather, in some diseases, and on unusual muscular exertion, the quantity is very much increased. It will seem almost incredible to many that so large a quantity can be given off from a single body, as but a few drops are generally visible at a time, but as it evaporates rapidly from the surface it escapes our observation; so you see there are constant exhalations from the body even in health, and in disease they are increased, and many of them are of a dangerous character, contaminating the air into which they are discharged, rendering it poisonous and unfit for respiration. The burning of lights and fires of any kind consume oxygen, its presence being necessary for supporting combustion. If a roll of lighted paper be held in a jar of air containing no oxygen, it will be extinguished.

How is the Air kept Pure?

How, then, you will ask, is the air around us kept in a healthy condition — suitable for respiration — if the ordinary processes of every-day life, respiration and combustion tend to make it poisonous?—This is provided for by what chemists call the *diffusion of gases.* If two jars containing gases of different density be held mouth to mouth, the gases will mix with each other instantly;

and as the air is composed of gases, the same rule applies to it, viz., that air of different kinds mix readily with each other. To illustrate this, open a door between two rooms, one containing warm air and the other colder air, and no matter how slight the difference in temperature, you will feel the air rushing from one room to the other until the temperature is nearly equalized in both rooms; so that as the air is *always* more or less in motion, the vitiated atmosphere immediately surrounding our bodies is constantly being diluted by purer air being brought in contact with it, and this is the great principle of ventilation; but how few know it, or knowing it, *act* on it.

Bad Effects of Impure Air.

How very often, when a physician approaches the bedside of a patient — who is suffering perhaps from some disease which is contagious in its character, when the surroundings are favorable for its propagation — does he find the temperature of the room approaching the same degree of heat as the patient's body, and the air loaded with the contagious exhalations of the disease, owing to every door and window being shut, and sometimes even the openings which the carpenter and builder has left are closed up. That this arises as much from ignorance as neglect, I admit, but I do not admit that this ignorance is always excusable. Every one knows, or should know, the effects of the deprivation of fresh air on persons previously in good health. The operatives employed in a factory deficient in ventilation and light, who entered ruddy-cheeked and healthy looking, soon become pale and debilitated in appearance. Dwellers in underground cellars and other unventilated places do not retain their health any length of time, and are subject to very many diseases that those more favorably situated escape. Remember how the confined air of the "Black Hole of Calcutta" destroyed those who an hour previously were in perfect health. An extreme case, of course, and yet the difference between that "Black Hole" and others that I have seen was only one of degree. I have been into more than one *sick-room*, even, that was only a modified "Black Hole." If this is the effect of want of air on persons previously in perfect health, whose organizations are in the best possible condition for resisting noxious influences, how much worse must its effects be on those who are prostrated with disease, their bodies at a higher temperature than usual, the circulation and respiration increased in frequency,— consuming more of the vital principle of the air — oxygen — and exhaling more of the principle which renders it poisonous — carbonic acid gas? This particularly applies to diseases of the character of typhoid and typhus fever. This state of things too often exists where there is no necessity for it, and the only excuse to be offered is *ignorance*. This ignorance of the necessity of ventilating a room which has been made as close and as hot as an oven, where the confined air is not only dangerous to the patient but to the attendants as well, combined with the strong prejudice which many people possess against admitting fresh air to the sick-room, in the fear that the patient shall "catch cold," is a great obstacle to carrying out any system of ventilation, however simple; and it is necessary that the patient and his attendants should be rightly informed on this point. That the passage of a strong current of cold air directly over the patient may be productive of injury, is true, but its danger is greatly exaggerated, and the means of avoiding a "draught" but imperfectly understood.

The Situation of the Sick-room.

The situation and construction of our modern houses varies so much, that it is impossible to describe any one mode of ventilation that will answer for all, and in many cases the attendants will have to exercise their judgment and common sense; and we will here state one or two general principles that will aid them in applying any mode of ventilation they may select. The first great principle of ventilation is this, — that ready means of admission for fresh air should be provided, and also easy

means for the foul air to pass out. For this reason no room should be used as a sick-room (when possible to avoid it) that is not provided with windows on two sides at least, or openings by doors or windows on opposite sides of the room. A pleasant, sunny room should always be selected when practicable.

How Air is Purified.

The action of fresh air admitted into a badly ventilated room may be illustrated in this way: if we pour clean water into a vessel already filled, or partly filled, with water that is not clean, they mix readily with each other, and the water in the vessel becomes less impure; if we continue to pour in fresh water the vessel overflows, the surplus water runs off, and the continued addition of clean water in a short time renders that remaining in the vessel nearly or quite pure. So it is with good and bad air (for air and gases mix more readily even than water). No matter how impure the air in a sick-room may be, the admission of fresh air at one side, with means of exit for the foul air at another point, dilutes and purifies the air remaining in the room to such an extent as to render it suitable for respiration.

Impure Air is mainly at Top of Room.

The most impure air is generally near the ceiling, for although the carbonic acid gas, and other agents that make it impure, are heavier than ordinary air, yet air which has been heated in the process of respiration by the lungs is lighter than that which has not been used in breathing; after escaping from the lungs, therefore, it ascends to the upper part of the room, carrying with it the carbonic acid gas and other products of respiration and combustion. On a cold day, the air which has just been breathed can be easily seen ascending upwards as it escapes from the lungs. The upward tendency of hot air coming from a stove or register is also visible.

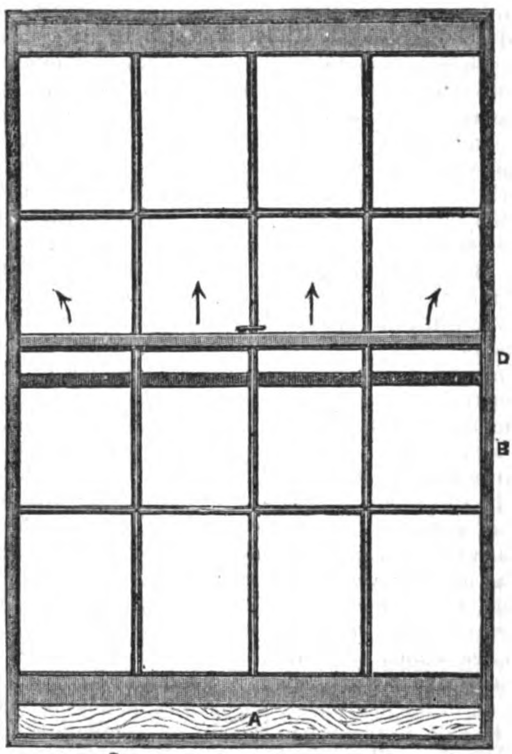
Special Modes of Ventilation.

Probably there is no mode of ventilation that can be readily applied to most sick-rooms, where no special arrangement for ventilation exists, more effectual than that of opening widely the doors and windows of the room, covering the patient well as he lies in bed, and allowing a current of fresh air to sweep through the apartment. In warm weather, of course, the temperature of the room will not be affected by this, and in winter the patient can remain covered until the temperature is raised to a comfortable degree. In this way all danger of a sick person "catching cold" will be avoided. This is a very primitive mode of ventilation, but an effectual one, as the current of fresh air sweeping through the room so effectually removes the noxious gases and effluvia as to leave the air remaining in the apartment comparatively pure and healthy. I have applied it in innumerable cases where no better means of ventilation existed, always with the best results, and never with the least harm or inconvenience to the patient. In many cases this is the only means of ventilation available. A room can be purified thoroughly, in this way, several times daily. If it can be readily and conveniently done, the patient may be removed to an adjoining room during the process of ventilation, but this is not really necessary, as the bed-coverings will be sufficient protection from the air, however cold. For maintaining the air of a sick-room in good condition after it has been purified, there is no better method than to open a window, at each side of the room, for an inch or two, at top and bottom; or a door or window opening into an adjoining room or hall in which the air is pure and fresh, may be kept open. In cold weather it is only necessary to see that these openings are not in a direct line with the bed, and thus *a "draught" of air over the patient will be avoided.* Either of the above modes of ventilation may be applied to any room at a moment's notice, as it is only a matter of opening doors and windows, and it is necessary to exercise discretion only in regard to their position with the patient's bed, when the air outside is colder than that in the apartment.

I now wish to describe a mode of

ventilation very easily applied, and capable of being put in operation at a very few minutes' notice, in a house of almost any form of construction, from a palace to a cottage. I have often practically tested it, and have never seen it in operation except under my personal direction. Its cost is almost nothing, and it is applicable to all kinds of weather, winter as well as summer, as all draught is avoided, — rainy weather as well as dry, — because with this arrangement the rain cannot penetrate; whereas, if a window is lowered at the top in wet weather, the rain is very apt to be driven into the room. The plan is this: a piece of wood about an inch thick, three to six inches wide, and just as long as the width of the window-casing of the room to be ventilated, is provided. Now raise the lower sash of the window, lay the strip of wood on the bottom of the window-casing, — its edge resting on this, — and the ends in the grooves in which the lower sash slides; close the sash down snugly on the slip of wood, and you will find that an opening is left between the bars of the upper and lower sashes of the window where they meet in the centre, as shown in the engraving, *Fig.* 1. The air passes through this opening in an upward current towards the ceiling, or else will pass outward in a downward current from the top of the room, so that all danger of a draught is avoided. One or more windows fitted in this manner on each side of a room (or even on the same side if windows exist on but one side), secures perfect ventilation without discomfort to the patient. On account of the difference in the temperature and equilibrium of the air in the room and

Fig. 1.



A, slip of wood, its edge resting on C, bottom of window casing. B, lower sash raised, but closed down on A. D, opening between sashes through which the current of air passes in direction indicated by arrows.

that outside, an outward and inward current will be established, a stream of fresh air passing upward in the direction of the opening between the sashes of the window, toward the ceiling of the room, and another current passing downwards from the top of the room through the window on the other side, thus maintaining a nearly perfect system of ventilation, and one that can be put in operation more readily than any other plan known. The direction of the currents is such that the foul air is removed from that portion of the room where it is apt to be most abundant, and yet the patient is free from its influence and from all danger of a draught. The use of this easy means of ventilation need not be restricted to the sick-room, but it would be well if all the rooms of our houses had one or more windows fitted in this manner, — particularly sleeping-rooms, — and thus an efficient means of ventilation could be secured adapted to any season of the year. The slips of wood can be painted of the color of the window, so that they will not be readily noticed, or they can be made of ornamental woods, so as to be used in parlors and drawing-rooms, if necessary. This system of ventilation would be nearly perfect if it could be effected nearer the ceiling, but, when necessary, the upper sash can be lowered a little at the top. If the slip of wood has been properly fitted to the grooves, no draught whatever will be felt at the bottom of the window.

In order that any system of ventilation may be effective, it is necessary that the air admitted to the room should be as pure as possible. To this end it is imperative that the location of the sick-room, its surroundings, and the surroundings of the whole house, should receive attention. The sick-room should be as far removed from sinks, water-closets, etc., as possible, or if near them, care should be taken that their covers are tightly fitted, as otherwise dangerous gases are likely to escape into the air of the apartment. Attention should be paid to the drains and cesspools, and the cellars and yards about the house should be kept free from decaying animal and vegetable matters, and heaps of refuse of any kind should be prevented from accumulating in the vicinity of the house and grounds. All offensive matters should be *instantly* removed from the sick-room, and the apartment purified at once. The ordinary disinfectants, carbolic acid, chloride of lime, etc., by being diluted with water and exposed to the air in shallow vessels, will destroy any offensive odor, but they sometimes do more harm than good by concealing bad smells and preventing attention being directed to their cause. The best disinfectant is the removal of the cause, and the admission of plenty of fresh air to replace that which has been contaminated. It may not be generally known that furniture and clothing catch and retain in their substance the exhalations of disease; therefore everything of this kind which has been exposed to the air of the sick-room should be freely purified, and, if possible, thoroughly washed. There is no doubt that disease is often carried from one place to another by means of clothing, particularly woollen fabrics. The bed-clothes should be changed as frequently as possible. The presence of too many persons in the sick-room should be avoided, as they can be of no benefit, and do harm by helping to consume the fresh air of the room. — How shall we know when the air of a room is impure? may be asked. There is no better guide for this purpose known at present, than the sensations experienced by a person coming from the fresh air into a room where the air is loaded with impurities, for they will quickly perceive the foul odors, the hot stifling character of the air, and, if not accustomed to it, will soon be attacked with headache and drowsiness. It is possible that some time an instrument may be devised that will show the state of purity of the air in a room, as the thermometer and barometer now indicate its condition in other respects. If attention be paid to the details spoken of, and some one of the above modes of ventilation adopted, no difficulty will be experienced in keeping the air of a sick-room in such condition as will be most favorable, not only for

the patient's recovery, but for the health and comfort of the attendants. In very many cases the sickness and prostration experienced by those who have been in attendance on the sick, is due more to the effect of the poisonous air of a sick-room which has not been properly ventilated, than to any other cause.

In this connection some may desire to know, how the oxygen of the air, which is constantly being consumed by the respiration of the whole animal kingdom and by the innumerable processes of combustion which are constantly going on, is replaced. This is effected by the operation of one of the laws of compensation so abundantly presented by nature in her different aspects. The life of the animal kingdom is sustained by the consumption of oxygen;—and carbonic acid gas (which is poisonous to animals) is given off by them; *the vegetable kingdom, on the contrary, get their life from this very gas which is poisonous to animals*, and which is absorbed from the air by trees, plants, flowers, and vegetables of all kinds; *these plants, etc., in their turn give off oxygen, which is necessary for the life of animals*, and thus these two great systems of animal and vegetable life furnish each other with the substances necessary for maintaining themselves in healthy growth and vigor, giving strong evidence (as every process of Nature does) of the great wisdom and power that created and rules the Universe.

MUSCULAR MOTION.

OF all mechanical powers, again, the simplest are those known as levers, of which there are three varieties. Now, a lever consists of a rigid or unbending bar or rod, whereby a force is transmitted from one point to another, sometimes gaining power, sometimes losing it. In one form it consists of a rigid rod, movable upwards and downwards only, on a given point, which is called a *fulcrum*. At the one extremity of the rod a certain power is exerted, at the other is the weight to be raised, or the body to be influenced.

Now when the fulcrum is near the weight, the power will have the advantage of the long arm of the lever; but, on the other hand, will have a longer distance to travel through before bringing the weight to a certain level. On the other hand, were the fulcrum nearer the power than the weight, there would be a loss of power; but a gain in the distance to be travelled through, which, as it must be done in the same time by both arms, is technically known as a *loss of velocity*. On the other hand, were the fulcrum equally distant from power and weight, both would be in exactly the same predicament; there would be neither gain nor loss in power or velocity, but the force would be transmitted unimpaired from power to weight, and the velocity with which these would pass through a given distance would be the same. This is the condition in that useful example of a lever, the common balance for weighing sugar and tea and such like commodities, where the pound weight is the power, the knife-edge by which the balance is suspended is the fulcrum, and the substance weighed is the weight to be raised.

In another form of lever we have the power at one end, the fulcrum at the other, and the weight between the two; so that it is evident that in this there must always be a gain of power, as the weight, being nearer the fulcrum than power, will rest more upon that extremity of the lever, whilst there is a loss of velocity, the power having to to travel through a greater distance in a given time than the weight has.

In still another form of lever the very reverse is the case, for, in this instance, the weight is at one end, the fulcrum being at the other, whilst the power is between the two; so that, in this case, there is invariably loss of power and gain in velocity. As common illustrations of these forms of lev-

ers, we might take of the first, the act of stirring the fire with a poker; here the coals are the weight to be raised, the bars of the grate are the fulcrum, and the power is the hand applied to the end of the poker. So, of the second, a man pushing a wheelbarrow is a good example: here, the fulcrum consists of the wheel resting on the ground, the weight lies in the barrow, and the force is applied through the medium of the handles beyond it. Of the third form of lever we might take an example from a man in the act of dragging from the wall a ladder leaning against it; this he does by pulling one of the steps on a level with his shoulder (the power), and pushing his foot against the lowest step of the ladder (the fulcrum), and so raising the ladder (the weight) straight up in the air.

When we come to examine the human body, we find examples of all these forms of levers, although not in the same abundance. Thus of the first, where the fulcrum lies between the power and the weight, we may take the common illustration of a man who has fallen asleep in his chair, when insensibly his head falls forward on his chest. Suddenly he awakes, and throws up his head, thus calling into play a lever of the kind described. For, here, we have the head hanging forward as the weight, the fulcrum is the back-bone on which the head rests, whilst the power is the muscles fixed to the back of the head and the back of the chest. The same kind of action is seen in a horse throwing up his head after drinking, and so on; but levers of this kind are not very numerous in the human body.

The second form is exemplified in that kind of action which is implied by a man standing on tiptoe, for in this case the whole weight of the body, which ordinarily rests on the arch of the foot, is thrown forward, so as to rest on the toes, by means of the strong muscles in the calf of the leg contracting, and dragging up the heel. The toes are the fulcrum; the body resting on the arch of the foot is the weight; and the tendon of Achilles connecting the great muscles of the calf with the heel represents the power.

Neither is this kind of lever common in the human body, which, for the most part, chiefly affords illustrations of the *third* kind of lever, where the weight is at one end, the power in the middle, and the fulcrum at the other end. To take a common example: in bending the forearm and hand on the arm, so as to bring the hand on a level with the shoulder, a strong muscle, called the *biceps*, is brought into play. This is the power, and it acts on the forearm just in front of the elbow joint, which is the fulcrum, whilst the hand, and anything contained in it, represent the weight to be raised. Now, the reason why this kind of lever is so much more common in the human frame than any of the others is simple enough. There is, in the first place, the fact that it admits of much greater symmetry, but, from our present point of view, this is of no consequence; the second is, that, in the animal frame, the power which may be applied is practically unlimited, so that a gain of velocity is of much greater importance than a loss of power, for a muscle can easily be made big enough to insure strength as well as swiftness.

Still, in the human body, the means of employing force are identical with those seen in the steam-engine, for there, also, we have to deal with a series of levers. The up-and-down motion of the piston is communicated by means of a crank to a horizontal beam, which bears one or more toothed wheels, or some similar means of carrying power, from one spot to another. But these toothed wheels are only levers, where the axle is at once fulcrum and power, a combination which implies the greatest possible velocity with the greatest expenditure of power. The wheel which is driven by the one attached to this axle represents the weight.

When further we come to consider these mechanical forces as applied to the human body, we have to notice that, in very many instances, the tendon of a muscle is inserted obliquely into its bone; this implies an additional

waste of force, for the nearer the perpendicular a force is brought to act on a lever, the greater is its effect. But, just as outside the body we find the direction of a force changed by means of a pulley, so we find the same thing accomplished in the body, when the tendon of a muscle is bound down by a sheath or a ligament, thereby effecting the change of direction with very little loss of power.

In all muscular actions taking place in the human being, the mechanical principles we have laid down are observed, but they are probably best illustrated by the various forms of progression, that is, moving from one place to another, employed by the human being. This leads us to consider another point in mechanics connected with what is known as the *base of support*, as applied to the centre of gravity. Every one knows how much more difficult it is to keep upright a tall, thin body, than a broad and flat one; or, to take an extreme instance, to keep a spinning top upright on its point than on its head. This is because the base of support is narrow in the one case, broad in the other. In walking at sea a man strives to keep his feet apart, because the line from the centre of gravity naturally falls between his feet, and the farther they are apart the greater is his basis of support, and this habit gives to sailors their peculiar, and, to landsmen, awkward looking gait. There is an old saying, that cats always fall on their feet; the reason is, the line from their centre of gravity falls downwards to the ground between their four limbs, and being extremely active they can always manage to keep it there. So babies, when beginning to move about, crawl before they walk, the centre of gravity being so much more easily kept within the base of support in the one case than in the other. As soon as the centre of gravity is disturbed, so that a line drawn from it, perpendicular to the surface of the earth, falls without the base of support, a movement must be made, or the individual will fall down. This explains the old trick of asking a man to walk up to a wall, to place one foot close to it, and parallel with it, and then, asking him to raise the other, he finds he cannot do so without falling, simply because his centre of gravity would fall without the narrow base of support afforded by the one foot.

Now let us consider the means by which a man may move from one place to another, thereby expending force in causing the contraction of certain muscles, these muscles acting on certain bony levers, whereby the body is moved. This leads us to consider the ordinary attitude of man in walking, the erect posture characteristic of the human race. The maintenance of this posture is not a merely passive act, for it requires the constant action of a certain number of muscles, which act in opposite ways, and so keep the human being upright. The first thing to be noted is the way in which the body is supported on the foot. The foot itself consists of an arch, the base of which is more extended in front than behind, and the whole weight of the body is made to fall on this arch by means of a variety of joints. These joints further enable the foot to be applied to rough and uneven surfaces, so that the flat portion of the foot may be adapted to these without inconvenience. The foot is connected with the leg by the ankle joint, before and behind which pass down tendons of muscles situated in the leg and directed to the toes, so that when both contract equally, the leg is held firmly on the foot or the foot on the leg. The same arrangement is seen at the knee and at the hip; and in each instance we have a series of muscles on one side which may be made to antagonize those on the other, and those in front to oppose those behind: by the simultaneous action of all these muscles the limb is held fast, and the upright position is maintained. The one set of muscles, which keep the limb straight, are called *extensors*, those which bend the limbs are called *flexors*. It will thus be seen that the maintenance of the erect posture is by no means a passive effect, but the result of constant muscular contraction, so that when a man is stunned, or in any other way loses the

command of his muscles, the first consequence is his tumbling down. The same names are applied to the muscles of the arm, but they are only called into play at intervals, and are not so constantly in action as the muscles of the lower extremities.

Connected with this subject is a venerable joke current among students of medicine, to the effect that, once on a time, a rude examiner asked a student who was being examined by him, "Now, sir, what muscles should I call into play were I to kick you down stairs?" to which the dutiful reply was, "The extensors and flexors of my arm, sir; for I should immediately knock you down." In this same action of kicking, exactly the same muscles are called into play as in keeping the body upright, but they act in a different way. When a man stands erect, his foot planted firmly on the ground, any contraction of the muscles of the foot would only result in raising the body as on tip-toe; but should the limb be raised off the ground by bending the knee, then the muscles can act freely, and the foot can be moved in any direction; in the one case, the foot is the part most firmly fixed — in the other, the body is so.

Now, in walking, the first thing done is to throw the weight of the body on to one limb so as to free the other, which is then bent and flung forward until it reaches the ground; the centre of gravity advancing so as to fall between the two limbs, and beyond the original basis of support. When the foremost foot has been planted on the ground, the hinder one is found to be raised at the heel, so as to rest on the toes only if the forward step has been a long one, but this is not the case in ordinary walking. The muscles are now powerfully called into play so as to act upon the leg and foot; but this being resisted by the toes planted against the ground, the opposite effect takes place, that is to say, the body, being more movable than the foot, is thrust forward. The hinder foot is carried with the body until advanced to a level or in front of the other, the centre of gravity being at the same time carried forward with the body. Running is effected in the same way, but at a quicker rate, and the centre of gravity is generally kept quite in advance of the base of support; so that, if the feet are not moved quickly enough, or are interrupted in their progress, the individual is certain to fall.

It will thus be seen that the movements of the human body are effected in accordance with the same laws as regulate movement in the inanimate world. Of course we do not now speak of the intelligence displayed in these movements — that is a totally different thing; we only deal with the mechanics of motion as seen in, and illustrated by, the human body. In another article we shall speak of the adaptation of these principles to actual life in the practical forms of gymnastics and training.

STATISTICS OF LIFE. — The yearly mortality of the globe is 33,333,333 persons. This is at the rate of 91,554 per day, 3,730 per hour, 62 per minute. Each pulsation of the heart marks the decease of some human creature.

The average of human life is 33 years.

One-fourth of the population die at or before the age of seven years.

One-half at or before 17 years.

Among 10,000 persons, one arrives at the age of 100 years, one in 500 attains the age of 90, and one in 100 lives to the age of 60.

Married men live longer than single men.

In 1,000 persons, 95 marry, and more marriages occur in June and December than in any other month of the year.

One-eighth of the whole population is military.

Professions exercise a great influence on longevity. In 1,000 individuals who arrive at the age of seventy years, forty-three are clergymen, orators, or public speakers, forty are agriculturists, thirty-three are workmen, thirty-two are soldiers or military *employes*, twenty-nine advocates or engineers, twenty-seven professors, and twenty-four doctors.

SUGAR.

SUGAR has the same general composition as starch. It is, however, soluble in water, and when taken into the stomach is readily absorbed and taken into the blood. It has two forms, which are called cane-sugar and fruit-sugar. They both act alike on the system. Fruit-sugar is found in fruits, and is especially contained in the fruit of plants, as grapes, figs, plums, pears, and other sweet fruits. Cane-sugar is crystallizable, and is separated from the sugar cane, sugar beet, sugar maple, and other plants for didetical use; all the sugar ordinarily employed for food, and the manufacture of sweetmeats, is of this kind. Sugar is contained in small quantities in all kinds of vegetable food. Fruit-sugar undergoes the process known by the name of *fermentation*, by which the sugar loses a certain quantity of carbonic acid, and is converted into a compound known by the name of *alcohol*.

While the sugar-cane is the principal source of the sugars of commerce, the sugar-beet of France yielded in 1865-6 no less than 275,000 tons, and in 1859 the sugar-maple of America 30,000 tons; and more recently sorgham has been made to yield an immense amount of excellent syrup.

But sugar is by no means of recent discovery. It must have existed in China (where the sugar-cane is indigenous) and India for a very long time, and probably it was produced there, almost spontaneously, in a wild state. The first writers who mentioned it called it Indian salt. A celebrated Roman physician, of the name of Domitian, said that, whilst by its color and hardness it resembled salt, in sweetness it was like honey. As is the case even now with tea to a great extent on the Continent, sugar was used by the Romans for medicinal purposes only. With the importation of the cane, however, into Europe, either by the Saracens or by Europeans on their return from the Crusades, sugar acquired a new and greater importance, as an article of commerce and industry. Landed first at Cyprus and Sicily, it was thence carried into Madeira, and at the commencement of the sixteenth century was transplanted to Brazil and to several Spanish West India Islands. Introduced into Barbadoes under the auspices of a warmer temperature (sugar thriving best when the mean temperature is 76° or 77°), it speedily became a most profitable industry. The Caribbee Islands followed, and so great was the avidity to cultivate it, that, laborers being scarce, and the work of cultivating the cane in so hot a climate by white men so very difficult, the idea suggested itself of getting negroes for the purpose, for which the slave trade was established on the coast of Guinea.

A good deal has to be done before sugar from the cane can be used to sweeten our articles of food and drink. The cane is subjected to an enormous pressure, so as to extract the juice; which is made to run into large copper vessels or clarifiers, heated by steam, in order to separate the liquor from its impurities. When the clarification is complete, the bulk of the juice is reduced by boiling it in large pans, and is afterwards placed in concentrators or vacuum pans, till finally the sugar is cystallized; and, when separated from the uncrystallized portion, is put into hogsheads, and sent thus to the sugar refinery. There the sugar is again liquified, heated, filtered, and concentrated; it is placed in conical pots with the apex downward, and with a hole at the lower extremity; and, finally, a small portion of saturated syrup of sugar, not clay as formerly, is thrown over the surface of the pots, so that its moisture may percolate through the mass and contribute to its purification, a process now greatly facilitated by the centrifugal machine. The impurities of sugar are either organic, — which consist of fragments of the cane, grape-sugar, albumen, an insect peculiar to cane-sugar, fungi, woody fibre, and starch granules, — or inorganic, which consist of lime, lead, iron, sand, and grit. The insect referred to was

discovered by Dr. Hassall, who was the first to employ the microscope in his researches into the adulteration of sugar. This insect is a beetle-like animalcule, of the genus *Acarus*, and approaches somewhat in its organization the *itch mite*. It is found in almost all unrefined cane-sugar, and hence those who use this kind of sugar to sweeten their drinks *must* swallow several of these disgusting insects in a living state, for the heat of the beverage is not sufficient to kill them.

The presence of these insects, in connection with the other impurities named, render the common brown sugars of commerce wholly unfit for consumption. Hence the necessity of refining it, by which process almost all of these impurities are got rid of.

But how is it that sugar planters do not attain, or try to attain, the maximum of excellence as well as the maximum of quantity? Why do they send us sugar with so much impurity, if by a little more labor and energy they can render it as good and pure as we can! But as well may we ask, why is it that India, where cotton has been an indigenous produce for centuries, has never succeeded in manufacturing it so cheaply and well as we can? Why is it that England can afford to buy up the raw material of cotton from America, pay the freight upon it, manufacture, and send it back again to compete successfully with the American manufacturers? The reason is very plain,—it is simply because the English have extraordinary facilities and peculiar advantages for manufacture, which enable them to produce cheaper than any other nation. Compare, for example, the position of a refiner in the West Indies and in this country. There the machinery and apparatus are much more expensive, for they must import them. They have greater difficulty and expense in effecting repairs; they have to import coal; labor with them is very costly and uncertain, whilst skilled labor is especially expensive. Capital again commands a much higher interest. Even water, so important in the manufacture of sugar, is quite scarce there as compared with this country. But independently of these disadvantages, the planter has plenty to do to cultivate the land and gather the crops. And if, after he has attended to that, he attempts the manufacture of sugar, he can only refine the sugar from his own crop, and for so many months in the year — whilst here, a refiner has the command of the market, and can work all the year through. There is no doubt that the sugar industry in the West Indies and at the South is capable of much greater improvement, and that much progress may yet be made, both in the chemical processes and in the manufacture; whilst the economical management of the plantations is in the highest degree defective. As an article of food, sugar possesses highly fattening properties, and as such must be considered as serving mainly for the production of warmth in the body; though in some degree, it also tends to promote digestion. There are, however, many persons who cannot use it as food to any great extent, on account of its inclination to produce acidity. In large quantities there can be no doubt that sugar peculiarly affects the digestive organs; and perhaps also the teeth. It possesses many valuable qualities, and the amount fitted for individuals must be found by experience. The excessive use of sugar, say to the extent of a pound a day, tends to produce giddiness; which may, however, arise from the large amount of carbonic acid evolved during its decomposition. It is largely employed in pharmaceutical preparations; for fermentation; for confectionery, sweet-meats, etc., etc.

The amount of sugar consumed in the United States during the year 1859 was 431,184 tons, or about 30 lbs. per head. The average increase of its use during the decade ending 31st Dec. 1859, was 6¾ per cent. per annum, which would give in round numbers 990,000 tons, or nearly 50 lbs. per head as the amount consumed in 1869.

The amount consumed in Great Britain in 1869 was 586,954 tons, or an average of 43 lbs. per annum for each individual; while in Russia the yearly consumption does not exceed 3 or 4 lbs. per head.

THE SCIENTIFIC AMERICAN *VERSUS* CARL BOTH.

THE *Scientific American* of July 30, 1870, contains an article which begins as follows: "Some months since, a controversy arose between some of our correspondents in regard to the assimilation of mineral matter in the animal economy. The discussion was not a very satisfactory one, as it was conducted by those who evidently had not given that attention to physiological and chemical facts demanded by the nature of the subject." In plain English, this means that the *Scientific American* published some twaddle about assimilation from men who knew nothing about it.

From an article entitled "OUR BREAD," published in *Good Health* for October, 1869, a paragraph is quoted, and also the principal points which Prof. Horsford brings to bear against it, in an article published in *Good Health* for June, 1870, and then the reply of the writer, published in *Good Health* for July, is completely annihilated in the following *scientific* manner: —

"How any one at all acquainted with the chemistry of cereal food, or with the physiology of assimilation, can dispute these plain facts, — for undeniable *facts* they are, — passes our comprehension. Nevertheless, a man who at least pretends to knowledge of both physiology and chemistry (with how much reason will be seen further on), has been bold enough to deny that they are facts."

The "reasons further on" are as follows: —

"This (Prof. Horsford's article) was replied to by Dr. Carl Both, in the July number of the magazine referred to. His assumption of knowledge is quite astounding. Dr. Both appears to have grasped the secret of life. To him, all that has been mysterious to the profoundest physiologist, hitherto, has been unveiled, and he hurls this astounding discovery forth without even the minutest note of preparation. Well may the scientific world stand thunderstruck at the fact that he has found out the mystery of mysteries, — what is life.

"He does not deal in glittering generalities. He does not tell us, like Coleridge, that life is 'unity in multeity,' but, in his first sentence, he utterly overwhelms us with the following definition:

"'The chemical combinations, exchanges, and reactions of the fourteen elementary minerals composing the human body in connection with warmth, light, electricity, galvanism, and magnetism, constitute what we call life.'

"There is nothing doubtful about this. The Doctor evidently thinks that a 'wayfaring man, though a fool, may not err therein.'

"But will the Doctor, whose profound erudition we greatly admire, do us the favor, by the aid of this definition, to draw a boundary line between things living and things lifeless. Of course he should be able to determine the precise time when life ceases, since then — to do full logical justice to his definition — some one or more of the elements of life ought to cease in the animal organization.

"We are willing to wager the Doctor will say, if he does us the favor to respond, that it is galvanism or magnetism, since, from some subsequent remarks, we are inclined to believe he makes the use of these agents a marked feature of his practice. Surely, it cannot be chemical action, or heat, or light, which ceases at death. It must then be electricity, or galvanism, or magnetism, since, in the Doctor's philosophy, these appear to be distinct forces. We are anxious to obtain more light upon this theory of life, which, however, is rather too dogmatically enunciated for a mere theory.

"Dr. Both commences by a point-blank denial of facts stated by Prof. Horsford, quoting only as authority for such denial a single writer on therapeutics, whose name, we venture to say, not one medical man in a hundred, in this country, has ever heard mentioned. But what he lacks in authority he makes up in assumption, as he denies *in toto* the very general belief,

among physicians, that iron is a useful remedy in cases of the impoverishment of the blood, and charges this belief upon their 'credulity and imagination.'

"He, however, gives us his opinion of the office which iron performs in the blood, namely, that it 'serves principally as a necessary body for the production of animal magnetism, and that it appears as metal, or perhaps as oxide, but, probably, in a form as yet entirely unknown.'

"Now we confess to never having heard of Dr. Both until his name appeared as the author of the article under consideration, but we are satisfied that he is one of the 'Universal Remedy' school of practitioners, and we would be willing to risk something that animal magnetism is his hobby. It is these hobby-ridden and hobby-riding medical men who claim to have got deeper into science than any others, and who are always ready to frame theories which have no basis in fact.

"But the Doctor at length makes an admission which seems to us a surrender of his position. The laws which control assimilation are admittedly the same for all warm-blooded animals. But Dr. Both admits that fowls take lime into their stomachs to form the shells of their eggs. Now, if fœtal growth, from the earliest period, be not a process of assimilation, will Dr. Both tell us what it is? If not assimilation, it must be mechanical accumulation, and we hardly think any man can be found so bold as to claim that the shells of eggs are mere mechanical deposits of the raw material.

"Dr. Both does not deny that it is assimilation, but he does deny that, because the fowl can digest lime, the lion, or the cow, or the human organism can do the same. In doing this, however, he makes the statement that 'lime serves a similar purpose in the body of the fowl that salt does in the human body,' which is certainly an acknowledgment that the human economy can directly assimilate mineral matter contained in common salt. Thus, the whole question of the assimilation of mineral matter, and the determination of how many and what kinds of such matter can be assimilated, stands just where it did before this discussion."

It would seem that the physiology of assimilation with the *Scientific American*, is pretty well settled with "undeniable facts." We confess to having been under the impression that very little is *positively* known about it; and that the whole scientific world was busily engaged on this subject, with the intent to produce "undeniable facts," which are very difficult to obtain. Already the attempt of such investigation "*passes our comprehension*"! Surely the range of that comprehension *must be very* large! The knowledge of the writer, however, is "*astounding*," and the "scientific world (of which our critic is the mouthpiece and exponent) stands thunderstruck without the minutest note of preparation"! We confess that we are somewhat surprised and astonished that the *Scientific American* should be astounded with statements, the knowledge of the accuracy of which was acquired more than twenty years ago. If the "*passed comprehension*" will take the trouble to read the various papers of the writer as published in *Good Health*, he will doubtless find much more of an equally astounding character. In the December number of *Good Health* he will find an article entitled "CELLS AND THEIR LIFE," from which he might possibly gain some idea of what life is; of the boundary line between organic and inorganic "things"; that "*lifeless things*" do not exist anywhere except in short comprehensions; and that he has already lost his wager by, at least, one sun-distance.

We are informed by our worthy critic that "Oesterlen," as an authority, is not known to one in a hundred of medical men. He must, we think, be very unfortunate in his medical acquaintance; — an ignorant uneducated class of men, whose patients we greatly pity; Oesterlen being acknowledged as one of the most reliable authors on the globe, and absolutely indispensable to any practising physician who, in the least degree, cares for reliable information upon therapeutics.

The learned critic next confesses to

having never heard of the writer until July 1870; but is perfectly "satisfied that he is one of the '*Universal Remedy*' school of practitioners." Short of comprehension, he is no less short of memory and of information. For had his memory been long enough to have reached as far back as the 25th of April, 1868, he would know that in the *Scientific American* of that date, a lengthy notice was published of a small pamphlet by the writer, who, to *scientific* men in Europe, has for some time been known, as well as in this country. It strikes us as being very reprehensible, evidence in itself of looseness, recklessness, and irresponsibility, when great men do not know what is published in their own journals. The "Universal Remedy" *school* is something entirely new, — it must have its location somewhere in Alaska, or in some of the unknown parts of Asia or Australia, or possibly in some undiscovered part of New York City. The learned critic is willing to risk something that magnetism is my hobby. It is lucky for him that he did not risk anything.

We confess to having a hobby; but are somewhat afraid that our *unknown* friend, with all his prodigious literary acquisitions and *un*limited comprehension, will be again "thunderstruck," should we divulge it. At any rate, we are sure that he will ignore it with justifiable contempt. Some years since several self-conceited lunatics in that barbarous country called Germany, the most insane of whom is a "hobby-ridden, hobby-riding medical" fool by the name of Rudolph Virchow, now Professor in a village called Berlin, situated in the State of Prussia on a little river called the Spree, somewhere in the middle and northern part of a peninsula called Europe, undertook to "astound" the wise men of the widest comprehension, and thunderstrike all their most "undeniable facts," by the publication of a system of nonsense called the CELLULAR PHYSIOLOGY AND PATHOLOGY. It so happened, that for lack of better advice, and in the absence of more renowned institutions of medical science, we were induced to become a pupil of this crazy professor, with the view of mastering his hobby. And simply because we knew no better, we introduced this nonsense into America in 1857, at a time when no one here had ever heard of or knew anything about it. And further, we became so "hobby-ridden," that we introduced this nonsense into *actual practice;* and confess to have been "hobby-riding" the medical profession with it ever since. We believe that some poor simple-minded medical men have really accepted the theory, although they have not been able as yet to introduce it into practice. *It is my hobby* to demonstrate this theoretical hobby in pathology, and in actual daily practice. The magnetism which we employ is what some folks call brains, and is not very much liked by some men. As to assimilation, if my *nameless* friend will take an advice, it might be as well for him to wait a little, to see if Professor Horsford has anything further to say. It is generally understood that Professor Horsford is quite capable of settling matters without the assistance of such eminent aid. Should the *Scientific American*, however, find it necessary to come to the aid of Professor Horsford on this subject, it would be most desirable that the editors would consult men who prophecy less, and comprehend more than my *nameless* friend, (say Dalton, or Flint, or some well-known chemist,) because it is necessary to comprehend the difference between absorption and assimilation, and to have a wide comprehension of a good many other things. We would also suggest that a little gentlemanly courtesy would well befit the nothingness of an editorial without point. For mental improvement we reccommend for perusal an argument againt Professor Horsford in an editorial of the Hudson (Mass.) *Pioneer* of June 4th, 1870.

Upon general talk of some unknown prodigy, and from the "astounding" fact that the writers of the *Scientific American* appear to have been taking a Rip Van Winkle sleep for the last twenty-five years, and, therefore, not only unacquainted with the investigations of science during this period, but

with what has been more recently published in their own columns, we have no further time to spare. It would be a pity to waste ink, simply to show that the *Scientific* American often appears as an *Un*scientific American. If "the whole question of the assimilation of mineral matter stands just where it did before this discussion," it stands exactly as stated in the October number of *Good Health*:—In no way can we introduce into the human system for assimilation, phosphorus, phosphoric acid, sulphur, iron, or any other mineral in an *inorganic form*. But if the *Scientific American* can assimilate this little "favor" in its columns as easily as it can absorb it from *Good Health*, the *first* point will have been made against us.

CARL BOTH.

HOW TO BRING UP BABIES.

WHO has not witnessed the despair of a young mother at the constant wasting sickness of her first child, she knows not why, for, though highly intelligent, and even accomplished, she has never learned how to rear a baby; and if the educated rich are ignorant on this subject, how much more so are the ignorant poor!

Education is happily becoming more practical every day; but it is a melancholy fact that, even now in this enlightened century, the first baby is often the object of its mother's first lessons in the art of rearing children. It is the *corpus vile* on which the *experimentum* is performed, and the future children reap the benefit. But surely the first-born, should he survive, might legally recover damages from his grandmother for causing him so much bodily torture, by neglecting the early education of his mother in this important particular: we commend this remark to the consideration of first-born babies. Ladies may now obtain degrees at Universities after the most stringent examination in Greek and Latin, arithmetic, anatomy, and physiology. No doubt digestion forms a part of the latter subject; but baby digestion is too trivial a matter even for ladies to be examined upon. "To teach young girls how not to destroy their future children, is surely as important as to teach them much of what is now considered essential for them to know. Girls should be practically taught how to fulfil their practical duties to their family and to society."

The importance to the State of rearing healthy children cannot be overestimated, for, other things being equal, the prosperity of a State is in direct proportion to the standard of health of its population; and it is during infancy and childhood that those diseases of neglect occur, which cause either the death of the child, or some permanent deformity rendering it through life a weakly member of the community, dependent on others for support, or which leave it with a delicacy of constitution which may terminate in consumption in later life, perhaps after the constitutional weakness has been communicated to a second generation.

There seems to be a very general belief in the existence of an intuitive faculty for rearing children. People have an impression that as the lower animals require no special instruction how to rear their young, so human mothers are in this respect equally well guided by instinct. The real truth is, however, that the lower animals are, as a rule, born in a much more independent state than human infants, and require very little attention; besides, their parents only possess sufficient intelligence to supply them with their natural food. Wild animals, happily for their offspring, have not the power of pounding up all conceivable vegetable and animal substances into attractive paps wherewith to feed their young. They have never been taught by family tradition the immense importance of greeting them, on their first appearance, with a jorum of sugar and butter; and yet their young survive!

We may very instructively contrast the higher orders of animals with man,

by which we arrive at the general fact that in proportion as animals are more intelligent, and in this respect approach more nearly to the human kind, so are their young more intimately and for a longer time dependent upon maternal affection and solicitude. The joys of parental love are not denied to the higher animals, but seem only to exist for the preservation of the successive generations, and to secure the exact imitation of the parent by the young. Thus we may in birds observe a remarkable degree of parental care and affection; indeed, there is no more touching spectacle than to watch the bird toiling all day long to supply its helpless young with food, and in their greater maturity exercising every art to entice them to try their yet feeble wings and encourage them to bolder flights. Birds are in this respect far more highly endowed than other animals which like them are oviparous, many of whom never see their young, but even in birds all parental influence ceases very soon after their young quit the nest. The degree of maturity to which young birds arrive before they escape from their shelly prisons, varies much in the different varieties: thus the young of ground-birds and water-fowl, being much exposed to the attacks of enemies, are hatched in a state of very considerable perfection. Young partridges may often be seen to run with the shell still clinging to their backs. Air birds, on the other hand, which build their nests in comparative security in trees and on the sides of precipices, hatch their young in a very helpless condition.

The next and highest order of animals, which suckle their young, enjoy in a still higher degree the pleasures of parental love, and from the distinguishing peculiarity of their class, a much longer subjection to maternal care and control is entailed upon the offspring. We may readily see how a greater intelligence must follow upon this longer intercourse between the mother and her young. True, we find as many degrees of helplessness in the young of these animals as among birds. Thus the young of ruminating animals, cows, deer, sheep, etc., who are more exposed to the attacks of enemies, and whose parents are less able to defend them, can run within a very few days of their birth; while puppies and kittens, and many animals of their powerful and warlike order (the carnivora), are born blind and helpless, and wholly dependent upon the parents. Still, in all this class the young are soon left to their own resources, and all parental affection is removed from them.

But in the human species the time during which the infant is totally dependent upon the mother is extraordinarily lengthened, and the youth of man is longer than the whole life of most animals. This long infancy and slow maturity are the sources of progress in the human race. Without this long interval for instruction we should be but wild animals, living by instinct, with no pleasure beyond that of existence, no joy but in the gratification of our passions, without experience, without knowledge. We sometimes see an approach to this state of things among the offspring of our criminal population, whose children are early weaned from, or have never felt, the affection and control of parents, and run wild, guided only by their own instincts and their faculty of imitation. They grow up as irresponsible for the crimes they commit, and are as justly punished, as the tiger who makes his evening meal upon the most plump baby of a Hindoo village.

When we contend that the rearing of babies should be a matter for education, we would not hint that there are any hard-and-fast rules, the carrying out of which would render of secondary importance the constant tender watching of the mother. Such rules, indeed, might largely apply for the welfare of the body, but who shall legislate for the mind? Health is "a sound mind in a sound body"; we may feed the body by rule, but the culture of the infant mind rests in very great measure upon that delicate tact and discernment which, combined with love of children, is the peculiar gift of a woman, but varies infinitely in different mothers.

The infant comes into the world per-

fect in form but powerless to act, with a mind as yet untaxed by thought, wakening to the thousand external impressions which shall hereafter sway it, yet possessing a bias inherited from the mingled sentiments of many ancestors — a bias which should not be overlooked because it does not render itself at once apparent, but should be carefully observed, in order that it may be softened, strengthened, or guided by a mother's gentle influence. No mother can be too thoughtful, too refined, too highly gifted with knowledge for this important task, for the effects of this earliest guidance are traceable throughout life. It is a matter of the commonest knowledge how infinitely children vary, even from very early infancy, in temper; they vary equally widely in nervous sensibility to all external impressions. A flea-bite, which will pass unnoticed by one infant, will send another into a fever; the irritation of the gums in the teething of one child will cause convulsions, while another will scarcely suffer at all. One infant will remain placid and still and pleased for hours — it is a good baby; another will chafe and fret if not constantly attended to — it is considered naughty; yet these are two definite degrees of sensibility, which every mother should recognize and allow for, and every doctor should know; for the placid child may pass with little notice into a dangerous state of illness, while the irritable infant is in a fever with a flea-bite.

During the first two or three weeks of infancy the baby is almost entirely in the hands of the nurse, and this good lady very often considers that the life of a child during the first twelve hours at least of its existence is entirely due to her untiring energy; for it is a remarkably common fact,—so common indeed that any one of intelligence lower than hers would regard it as natural,— that the mother is unable to nurse her child for the first few hours of its existence; so the moment the doctor turns his back the buttered sugar is disposed of, while the water-gruel simmers on the hearth or stove!

Now, except in particular cases in which the advice of the doctor in attendance should always be obtained, the child does not require anything sooner, and can be given nothing more suitable to its earliest requirements, than that which it naturally derives from its mother. And provided the mother's health be good, and she be able to nurse her child, *no other food whatever is necessary before it is six or seven months old.* But in order that this rule should hold good, it is necessary that the mother pay much attention to her own health, have a well-ventilated room and plenty of nutritious and suitable food, otherwise neither she nor the child will get on well. It is for this reason often necessary for the poor partially to wean their infants before they are six months old. There is, however, another very important fact to be borne in mind, viz.: that the child does not require to be nursed every time it cries.

During the first month an infant should be nursed every two hours; afterwards the interval should be gradually prolonged to three or four hours. Too frequent feeding is one of the commonest causes of illness (sickness and diarrhœa) in infants. It is of course important that the mother should get as many hours of uninterrupted rest at night as possible, and by giving the last meal late in the evening, and keeping to the same time, say eleven o'clock at night, the baby will sometimes get into the habit of resting contented for four or five hours, thereby recruiting its own digestive power, and allowing its mother time for a refreshing sleep. When maternal rest is imperative, the baby may be fed once during the night by the nurse with a little weak milk and water.

Babies should be as soon as possible made to sleep in their cribs, instead of being lulled to rest in their mother's arms; they will very readily get into the habit, and thus interfere less with other household duties — an important point with poor people.

It very commonly happens that the mother is unable to nurse her child for six months; sometimes not for three; sometimes, but more rarely, not even

for one. It is of the utmost importance in these cases that the child should derive nourishment from its mother, either wholly or in part, for as long a period as possible; for if they are suckled for even a week or a fortnight their chances of life are improved. When the mother is from any cause totally unable to continue to suckle her child before it is six weeks old, a wet-nurse should if possible be obtained, and should be most carefully selected by a medical man: one important point to be attended to in the selection is that the child of the nurse be of the same age as the foster-child. There is, however, a very grave moral question involved here: it too often happens that a woman who is attracted by the prospect of gain to go out as a wet-nurse, leaves her own child at home to be brought up by hand, or puts it out to be nursed by some person but little interested in its welfare, and the child dies. No conscientious person would therefore hire a nurse without satisfying herself that she is not sacrificing the life of another child for that of her own. A strong and healthy woman, well supplied with proper food, might without difficulty supply both her own and her foster-child with sufficient nourishment. People are apt to employ their nurses too lightly, without thinking of the injury they do to other infants, and even of the crime they encourage. Supposing that a nurse cannot be obtained, the child must of course be fed by hand.

The four constituents of milk which render it sufficient for every requirement of an infant are sugar, cream or fat, albuminous matter (*casein* or *curd*), and salts. Human milk and that of other animals contain these substances in various proportions, each variety being best adapted to the wants of the particular species.

Cow's milk is heavier than human milk, for which it is most commonly used as a substitute; it contains more albuminous matter, a larger proportion of salts, and is less sweet. In order to render this milk better adapted for the consumption of the human infant, it must be diluted with water and sweetened. The amount of dilution must vary with the age of the child: at first an equal part of water, or even a little more if the milk be very good; indeed, until the child is a fortnight old, one part of milk to two of water with a little cream is the best mixture; after the child is a month or six weeks old, about a third part of water must be added, after three or four months a fourth part of water, and when the child is five or six months old the milk may be given undiluted. The infant should be raised in the nurse's arms while taking the botttle. It is a common but improper practice for nurses and mothers to feed their children while lying flat on their laps.

The amount of milk or milk-and-water given at each meal must also vary with the age of the child — from six to eight tablespoonfuls, or even less, every two hours at first, gradually increasing to a small cupful every four hours when the child is five or six months old. A small lump of loaf-sugar, or half a small teaspoonful of *sugar of milk* should be added to each bottle of milk to sweeten it. Moist sugar should never be used for this purpose, on account of its liability to set up fermentation in the milk, and thus cause it to disagree. Cow's milk curdles more firmly than human milk, and for this reason sometimes disagrees. To rectify this, *lime water* may be substituted, either in part or altogether, for the water; or *carbonate of potash* may be added, in the proportion of a grain to each ounce of the milk: the former addition is most useful when the milk has a tendency to produce diarrhœa, the latter when the reverse is the case. By these means also a certain amount of acidity, not uncommon in the milk of stall-fed cows, may be rectified. A small quantity of cream, one or two teaspoonfuls to the half-pint, is often a desirable addition.

The milk should be warmed by holding the bottle containing it in hot water. When, notwithstanding the above precautions, it disagrees with the child, it should be boiled, by which means the proportion of curd is much diminished. It matters very little what feeding-bot-

tle is used, so long as it *draws* easily, and can without difficulty be kept perfectly clean. It should be rinsed out with clean water every time it is used, some clean water should be drawn through the tube, and the mouthpiece cleaned, and the tube and cork placed in water until again wanted. The smallest drop of milk left in the bottle or tube turns sour, and will inevitably set up fermentation in any milk which is added to it, and make the child ill.

But proper food is not the only thing which is essential to a child's health, if not to its life. Good fresh air, abundance of light and warm clothing, are scarcely less so. The nursery, even for the smallest infant, should be the most cheerful room in the house, airy, well lighted, its walls hung with attractive pictures. For the first two or three weeks before the infant can be said to have migrated into the nursery, the light must not be too glaring. The child should be washed all over with warm or tepid water at least once daily. In summer-time it should be taken out in fine weather once or twice a day, after it is a fortnight old, at first for a short time only; in winter-time it should not be taken out until it is at least a month or six weeks old; it should be carried by the nurse until it is four or five months old; by this means it is kept warmer, and, from frequent change of position, gets more exercise. After this age, however, a carriage is to be preferred, well supplied with wraps, and with a hot-water bottle for the feet. The simple plan of carrying an infant is, perhaps, the best for all purposes. By the frequent change of position there is no chance of the limbs becoming cramped, while much exercise is secured to the back; but caution is necessary here, for some infants are particularly weak in the back, and must only be held in a sitting position for a very short time together. Others, again, especially when insufficiently or improperly fed, are apt to become deformed by the bending of their thigh and leg bones in the directions in which they are drawn by their own weight. These infants must be kept lying down much longer than others. Swiss nurses carry their children on pillows, to which they are bound down by suitable coverings: this must considerably interfere with those kicking and jerking movements in which the youngest infants indulge, to their great delight and benefit. Babies' heads should be carefully protected from the direct rays of the sun — American babies at least. We have seen the babies of Eastern tribes calmly sleeping on their backs in baskets, one on each side of a donkey, with the midday sun pouring down upon their upturned faces with a force which would inevitably kill outright or produce brain fever in a white-skinned American infant. Kafir women carry their babies in pouches behind their backs; Indians, again, poise them upon one hip, where, when they are older, they hang on cross-legged, with scarcely any other support.

It is of the utmost importance to keep children warm; and the younger the child is, the more carefully must this rule be observed. Young infants have no means of keeping themselves warm, and are in this respect, as in others, wholly dependent upon those about them. It is a mistake commonly made by robust people, who say that children are made hardy by exposure to cold. Provided it be abundantly supplied with good fresh air, a child cannot be too carefully protected against chills and draughts. An apparently trivial discomfort, namely, coldness of the feet, should always be looked for and obviated; for it often leads to much suffering, particularly from uneasiness and cramps in the stomach.

Babies should learn to exercise and to *feel* their limbs from a very early age: a good arrangement for this purpose is to have a soft rug on which they can lie, and kick about at pleasure.

ICE. — London (England), with a population nearly thirteen times larger than that of Boston (Mass.), consumes only one half the quantity of ice; but, as a consequence of this intensely hot season, is waking up to the necessity of utilizing the wintry cold products to balance the summer heat.

WATER.

IT is quite impossible to exaggerate the importance of water in the economy of the world, whether animate or inanimate. There is no earth without it; there is no air without it; there is no life, animal or vegetable, without it. It is everywhere present — on the earth, above the earth, within the earth. It is everywhere active—circulating through air and rock, wearing away the sea-cliff, filling up harbors and forming shoals, eating out passages through granite, suddenly appearing out of some caverns, suddenly lost in others — obtained by boring deep holes in dry rock, lost by boring the same holes deeper. Never still, never idle, it is always carrying out, either in some matters of detail, or on the largest scale, the great work of nature, and helping to secure the eternal youth and freshness of creation.

We speak of water just as every one is familiar with it, and with no special scientific reference. Fresh water, as it comes from the spring, deliciously cool, pure, and sparkling in one place — boiling hot and abounding with healing influences at another; salt water, as it exists in the ocean, and as occasionally it issues from the earth; vapor of water, as it is carried up into the air, and is there invisible, or seen as mist or cloud, as circumstances and various influences act upon it; rain water, as it falls from the cloud and runs over the land, in brooks and rivers, to the sea, or collects in pools and lakes; crystallized water, produced in the most delicate, beautiful, and varied forms in the upper air as snow, and thence sinking gently in fine flakes on the ground; solid water, or ice, as it forms rapidly in the air and falls as hail, or as it collects and creeps down the sheltered mountain valley in the form of glaciers; or, lastly, as it floats away, a vast island or berg, from polar land. In all these varied conditions it is still *water* — infinitely familiar, but not the less strange — infinitely useful, but little thought of.

Water is not, as the ancients regarded it, an elementary or simple substance, although in all its properties it acts so independently, and is so permanent and universal, as fully to deserve and justify the importance that has always been attributed to it. It is a compound of two gases; but the composition requires the direct action of electric force to bring it about, and no decomposition into the gases is ever effected without corresponding electrical disturbance. Much of the mystery and many of the uses of water, in the terrestrial economy, are involved in this necessity of electrical action to form or destroy it.

The two gases — oxygen and hydrogen — of which water is a compound, are very different from each other in all their properties, having no tendency to mix, and neither of them having anything in common with their joint product. The one is rather a heavy gas, everywhere present, and forming an essential part of the atmosphere, which, indeed, consists of this substance diluted with another gas, called nitrogen. Hydrogen is the lightest substance known in nature. It is never found in a pure state, though so universally distributed in water; and when it is obtained artificially, its extreme lightness is its most remarkable property. Combined with carbon and nitrogen it is, however, capable of producing results hardly more striking for their vast and endless variety than for their use to man in various arts and manufactures.

The first mystery connected with water is its composition; for it is no easy matter to understand how a certain quantity of one very common gas being mixed with the same quantity of another gas, with which it has apparently nothing in common, should, on passing electric sparks through the mixture, become converted into vapor, and condense im-

mediately into a minute drop of fluid, apparently quite neutral, having neither taste nor odor, though the best known medium for conveying taste and odor throughout nature.

Difficult and slow as the composition of water is by human agency, it has gone on rapidly enough in nature to secure for us in this world an ample quantity everywhere. When first obtained in a pure state it appears capable of taking up and dissolving whatever it comes in contact with. Almost all known substances are to some extent soluble in it. Gold, silver, copper, lead, and iron, are all known to be contained in the sea. Already has it been proved that some spring water possesses an infinitesimal quantity of two elements at least not known or discovered elsewhere in our earth, but identified with corresponding substances in the sun's atmosphere. The sea abounds with various kinds of solid matter, held in perfect solution, which certain minute animal and vegetable atoms are able to separate and exhibit in marvellously-beautiful plates of flint, or curious rounded habitations of limestone, thousands of which might be accumulated on the blunt point of a needle. This universal power of dissolving matter, and the facility with which it parts with one mineral to obtain another, is a second great mystery of the natural history of water.

Unlike other substances in nature, water is presented to us, in many parts of the earth, under three very different mechanical conditions, so that there are few families of the human race who are not more or less acquainted with the fluid water, the gaseous vapor of water-steam, and the solid water-ice. Differences of temperature induce their differences of condition, but they exist even under all varieties of heat and cold. In the air there is always vapor—more, no doubt, when the air is warm, but much even when it is coldest and driest; for there is an atmosphere of vapor above us as real and as important as the atmosphere of mixed gases we call by that name.

So there is, in all probability, solid snow in the higher part of the atmosphere, forming those most delicate and exquisitely beautiful clouds, curling about in sweeps, or floating in the deepest blue of the sky in the finest summer weather. Certainly, snow falls on the lofty mountain-tops in all latitudes, and snow and ice can exist very easily, under diminished pressure, in the uppermost regions of our elastic air. So, also, even at the poles, fluid water is to be found, and thus the three states may be familiar in all parts of the earth. Unlike most other substances, water does not expand with heat and contract with cold at all temperatures. On the contrary, there is a certain known temperature at which fresh water occupies the smallest space, and this is one very common throughout the temperate regions, and in almost all lands outside the tropics. Even within the tropics, where the country is mountainous, this temperature is often reached. From it, as a starting-point, water expands both when heated and cooled.

It may seem a small thing that this should be a condition and a property of water; but such small things are the mysteries by which the well-being of the world is secured. The result is, in this case, beyond measure large and important. Were it not as we have described it, the water cooled down to become ice would be more compact, and therefore heavier, than fluid water.

But again, because water thus occupies a larger space as it turns into ice, as well as when it becomes heated beyond a certain point, it follows that a change of temperature tends to split up and destroy all those rocks and stones that the water has penetrated. Thus, there is an incessant breaking up and wearing away of the earth's surface wherever water reaches; for change of temperature is incessant, and it matters little whether the change is one way or the other. When it is considered how readily, and to what an extent, water finds its way into the substance of all rocks and enters the earth, the vast importance of this operation constantly taking place at the surface will be recognized.

Are we not, then, fully justified in

pointing out this curious property of water, by which it expands or occupies a larger space just before and during the operation of freezing, as one of the great mysteries of which we can see and calculate the useful effects, though the cause is completely hidden from our knowledge?

The fact that, under all temperatures and conditions of water, a part of it rises into the air to form an atmosphere of vapor, which varies in quantity according to the heat to which it is exposed, and which is carried through the air, changing into mist or cloud and dropping back to the earth in rain, is another wonderful and interesting fact, and a mystery that cannot easily be fathomed. Evaporation takes place from the surface of ice as well as from the tropical seas; water is sucked up from dry earth, as well as from a pool; and thus there is ever produced a change and a circulation which is of the greatest importance to the well-being of the human race — and, indeed, of all creation.

The water lifted into the air as vapor, being conveyed by the air to distant places, is there exposed to new conditions. A large part of it then falls to the earth as rain, and enters the thirsty soil. It passes down through dark caverns and narrow crevices into the hardest rock; it traverses innumerable channels, often concealed, but always leaving abundant traces of its progress. Occasionally it becomes exposed to a high temperature, under considerable pressure, and in this form is more than ever powerful and efficacious. It bursts forth in springs, and returns to the sea only to run its course again in a never-ceasing circulation.

The rocks through which the water passes never part with all their contents. When so perfectly dry as to yield no vapor on exposure to intense heat, they still contain water, so long as they remain solid, absolute decomposition and destruction being necessary to drive off the rest, which is either present in minute cavities, or forms an actual part of the composition of the mineral. Deprived of this, the substance falls to powder and changes its nature.

In the driest sandstones there will generally remain half a gallon of water in every cube foot (a block measuring a foot every way), while wet chalk contains no less than two gallons of water in the same space. Thus in a square of ground occupied by chalk measuring ten miles every way, if the whole is wet to a depth of 100 yards, the quantity of water contained in the rock would fill a reservoir of 6,000 acres to a depth of 10 feet. This quantity could, therefore, be sucked into the earth in a wet season over every such space, and the greater part removed by evaporation in drought. All rocks are affected greatly by weather, though few so completely as soft sandstone and limestone, sand and chalk.

The circulation of water through the earth is another of those mysteries revealed to us in the study of water. Water is the life of the earth, as blood is the life of man. From the great receptacle, the ocean, where it is never still, but beats and pulsates with the semi-diurnal tide, becoming aerated and fitted for its great uses by the raging wind and the ceaseless current, it rises continually into the air, its particles forming an essential portion of that invisible atmosphere which, while it supports, at the same time conveys the vapor, carrying it towards those vast tracts of dry land where the proportion of water on the surface is comparatively small.

Once arrived over the dry land, the vapor is converted into mist and cloud, and a large part of it falls as rain. A portion of this is re-evaporated; some of it serves to quench the thirst of every leaf and root, as well as every mouth and skin, exposed to its influence; but a large part of it runs away on the surface, dancing along in the brook, "sparkling out among the fern to bicker down a valley": —

"Till last by Philip's farm I flow
To join the brimming river;
For men may come, and men may go,
But I go on for ever."

Back to the parent ocean the ever-running river conveys part of the water that has collected on the surface and

has occupied distinct channels and watercourses, while the remainder, which has entered the earth, is not more idle. The earth and the rock are thirsty, as well as the leaf and the skin, and no inconsiderable proportion of the rainfall absorbed into the earth at every pour, moves on its way, and performs its task far out of sight, not so rapidly, but not less regularly, producing and keeping up a series of changes entirely dependent on this supply, and essential to healthy life upon the surface.

Wonderful indeed is this last and greatest mystery of water. We speak of the grave as silent. We think of the ground and the rock as permanent, and almost as if they were eternal. We do not feel, but we may, and ought, to know, that all beneath as well as all around is changing, and that there is abundant life in what we vainly call dead matter. We see it not; but a circulation goes on in all nature, perfectly consistent with apparent repose, and if we examine and carefully describe conditions of the earth at one time, and repeat our examination after an interval, we may chance to find the same form with a different substance — the same material, but a new arrangement of parts.

And in all these changes water is the chief agent. Heat and chemical action are powerful, but they act through and by means of water. Abstract water, if it is possible to do so in imagination, from terrestrial agencies, and we may picture to ourselves some of the results; but we shall see only a little way, because the consequences would ramify and penetrate, indirectly, far beyond those limits we are able to trace.

If we suppose water absent from the earth, the air would be without mist or cloud, and the full rays of the sun would fall directly on all terrestrial objects exposed to the light of day. The great ocean would be a vast salt desert — the land a bare, naked mass of burnt rock: there would be no life, animal or vegetable, not the smallest animalcule, not a lichen on the rock. The magnetic currents, now excited and set in action by every change produced in electric equilibrium, would cease to vivify and move the dry stones that would remain as a mere useless skeleton of the earth.

There would indeed be no world, such as we know it, if there were no water with such properties as those we are familiar with. All on this earth exists in a state of mutual dependence; but of all matter and all forms of matter, none can compare in importance with this wonderful compound.

INSTINCT AND REASON.

EXAMPLES of the intercommunication of ideas between animals of different races have, it is believed, been very rarely recorded. The subjoined one is from an eye-witness. An old mare, relieved from hard work in consequence of the infirmities of declining years, was turned into a field in company with a cow and several heifers. The pasturage in this field being of very indifferent quality compared with the rich crop of grass and clover in the one adjoining, longing eyes were cast by the animals on the tempting food from which they were debarred, and many attempts made to break through the intervening fence, which at some points was not in the best repair. One day the mare was observed to make a regular tour of inspection round the enclosure, evidently, as the sequel shows, to discover the most favorable place for escape. Having ascertained this to her satisfaction, she returned to her companions, and requested the cow's attention by tapping her gently on the shoulder, first with her hoof, and then with the head. The cow then followed her conductor to the invalided part of the fence, and the pair having attentively surveyed it together, went back for the heifers, after which, the old mare setting the example, the rest followed her over the gap, and found themselves (literally) "in clover." It would not be difficult to translate the quadruped ideas and language here into our own tongue. First, we may suppose the reflection of the old lady to be something like this: "The vegetation in that field looks particularly rich and good; it makes one's mouth water. I'll just go round and see if there's no way of getting in." Then, having discovered the suitable spot, — no selfish desire to leap the fence unobserved, and feast, like Jack Horner, all in a corner by herself, but, "I'll go and tell the cow, and

bring her to look at the place." This done, the two consult together, and agree that "it will do very nicely; but we mustn't leave these poor young things in the lurch; they must share in the feast; let us go back for them." If these were not exactly the reasoning processes that took place, the initiatory movements and final result lead us to conclude that they must have been very similar.

In our school-days we made acquaintance with a Newfoundland dog, whose knowledge of the value of money and careful provision for his future wants, were familiar to a large circle of admirers and patrons. He belonged to a clothier, and the entrance to his master's place of business was furnished with a couple of doors, some six or eight feet distant from each other, the outer one always being open in the daytime. On a large mat between the two was his constant post; he rarely, if ever, was absent from it except for a few minutes at a time, when he went to supply himself with provisions at a baker's shop a few doors off, at the corner of the street. Many were the halfpence saved from marbles, barley-sugar, taffy, and even from our daily allowance for lunch, which we bestowed upon the great, sagacious-looking creature, for the pleasure of seeing him walk to the baker's, and lay out his money in a biscuit. Sometimes we were disappointed of our amusement, for, if not at the moment hungry, he would take the coin and hide it under his mat, where, according to school-boy report, he had a fabulous amount (for a dog) of coppers, and from which he abstracted a penny or a halfpenny at a time, according to the state of his appetite. He knew perfectly well the difference between the coins, and their relative value; and that he was entitled to receive two wine-biscuits for the larger sum, and only one for the halfpenny. We have given him a penny, and seen him enter the shop and permit the attendant damsel to take it out of his mouth, but, instead of accepting the two biscuits offered him, he stood still, looking gravely at her as if something were wrong. This behavior was intended to signify that he only wanted a single biscuit on that occasion, and wished for the change out of his penny. Now and then he took a fancy for a French roll by way of variety; at such times he would "make no sign," and preserve a fixed impenetrability of countenance on the presentation, first, of the couple of biscuits, and then of a biscuit and a halfpenny; then his desire was understood. The people of the shop were, as may be supposed, accustomed to his ways, and able to interpret his mute expression; and as anxious to please him as if he had been a "regular customer" of the human species. After leaving school, I was told by more than one informant worthy of credit, that if you gave him a sixpence and accompanied him to the shop, he would receive the change, and then allow you to take it out of his mouth, satisfied with his two biscuits, and apparently quite conscious that so large a sum was never intended to be given him at one time. We never knew what became of the balance of his day's receipts, at bed-time, — whether his owner took care of it for him, and laid it out in new collars and mats as the old ones became worse for wear, or whether he slept upon it and guarded it. It was almost impossible that, unless gifted with an uncommonly elastic appetite, and a strict vegetarian to boot, his expenditure could have equalled his income. Poor old fellow! he was not a handsome specimen of his race, but "handsome is that handsome does," says the old proverb; and his intelligence and amiability made him a general favorite with the *habitués* of the well-frequented thoroughfare. He died long ago, and was properly honored by being stuffed and preserved. How he would have been perplexed, if he had survived to the days of the bronze coinage; clever as he was, it would have been some little time, we suspect, before he learned to distinguish between the old halfpenny and the new penny, so nearly of a size,

The following deliberate plan of retaliation, formed and carried out by a dog belonging to himself, is related by one who was a witness of the whole proceeding. The dog had been assaulted and bitten by another much more powerful than himself, and thinking that, in such unequal odds. "discretion" was "the better part of valor," he took to his heels and ran home. For several days afterwards he was noticed to put himself on half rations, and lay by the remainder of his food. At the expiry of this period he sallied out, and in a short time returned with a few of his friends, before whom he set his store of provisions, and begged them to make a good dinner. This being despatched, the guests took their leave, along with their entertainer, and followed by the dog's master, whose curiosity was excited. He watched their progress for a considerable distance, when a large dog marked out, by the leader, to his companions, as the offender, was furiously attacked by them all, and well worried before he could make his escape. The self-denial persevered in by this dog with a view to his revenge, and his knowledge of the efficacy of a bribe, are very remarkable; and he must have explained to his friends the service expected from them in return for their dinner.

That the faculty of memory exists in animals, there are many proofs. Bees, according to Huber, who had been fed in the autumn with honey at a particular window, returned in expectant crowds to the same place in the spring, when the window, closed through the winter by an outer shutter, was

reopened. The recognition of their own hives, out of a number of others, on returning from their excursions, would appear to be from a remembrance of its situation, rather than from any peculiarity about the individual hive. Swallows, on returning from their winter quarters in southern latitudes, resume possession of their former summer residences. A horse will almost always be found to preserve an acute recollection of any spot where he has received a fright, however many years may have since elapsed. We knew a pony in the neighborhood of Ripon, England, whose nervous system was, as a rule, in the best possible state; but there was a certain ford which it never could be induced to cross, nor even to go within fifty yards. If you persisted in attempting to drive straight on, the invariable consequence was, that the creature suddenly whirled round as if it had been shot. It had once been startled there, years before, — it was thought, by the noise of a waterfall close by; and the impression seemed fixed in its memory. No objection was made to any other ford, though one, which it had occasionally to cross, was much wider and fully as deep as the one in question. This said pony, by the way, had one or two very singular tastes, a great liking for strong peppermint lozenges being the oddest; it would take them to any amount, and crunch them with unmistakable relish.

We cannot just now call to mind where we met, long ago, with a very amusing example of memory in a horse, — the charger of the commanding officer of an Indian regiment. He was an exceedingly large and heavy man, and the horse having a dislike to carrying such a burden, acquired the habit of lying down on the ground whenever the colonel prepared to mount. This, as may be supposed, annoyed him, and, to avoid the ridicule of the soldiers, he parted with the animal, and procured another not so fastidious as to a few pounds more or less. We believe it was a year or two — certainly some considerable time — after that the colonel, visiting another station, was invited to review the troops there, and a horse was placed at his service, which, on his attempting to mount, immediately lay down in full view of the assembled regiment. It turned out to be the identical dismissed charger, who had at once recognized his former objectionable owner.

A very interesting anecdote is related by Frederic Cuvier, showing not only great power of memory, but also strong attachment in an animal generally supposed to be destitute of all good qualities — the wolf. A gentleman had trained up one from infancy till he was as tractable as a dog, would follow him about whenever allowed, and become quite low-spirited when he was absent. Being compelled to leave home, his master made him over to the Menagerie du Roi, where he at first drooped and refused to eat, but gradually became more reconciled to the situation. After the lapse of a year and a half his master returned home and paid him a visit. The wolf knew his voice the moment he spoke, and flew to him with every demonstration of delight and affection, planting his fore-feet on his shoulders and licking his face. The same scene occurred after a second separation of three years' duration, the wolf, as before, at once recognizing his master's voice, and bounding towards him as soon as set at liberty by the keeper. A final parting followed, and from that time the faithful creature never appeared to regain his former spirits and equable temper, occasionally indeed betraying ominous signs of the ferocity inherent in his race.

Stories of elephantine intelligence are numerous, but most of them too well known to repeat here. One, however, recorded by a traveller, in a paper contributed to a scientific journal, and which is vouched for from personal knowledge, is worth a brief notice. The author was on a journey, and several elephants were engaged to carry his tent and baggage. One of them, euphoniously named Fattra Mungul, coming on the scent of a tiger, was seized with a panic and ran off into the woods, the driver saving himself by clinging to the branch of a tree and letting himself down. All attempts to recover the animal were fruitless, and the party proceeded on their way, giving up all idea of seeing him again. Amongst a herd of wild elephants entrapped eighteen months afterwards was found the runaway, who at first was as uproarious and unmanageable as the rest; but on an old hunter who knew him well riding up to him on a tame elephant, pulling him by the ear, and ordering him to lie down, he immediately obeyed the familiar word of command and became perfectly tractable. This writer also mentions a female elephant which escaped from her owner and was at large for *fourteen years*. On being recaptured she remembered her former driver and instantly lay down at his order.

Locke adduces the learning of tunes as proof that birds are gifted with memory. "It cannot," he says, "with any appearance of reason be supposed — much less proved — that birds, without sense and memory, can approach their notes nearer and nearer by degrees to a tune played yesterday, which, if they have no idea of it in their memory, is nowhere, nor can be a pattern for them to imitate, or which any repeated essays can bring them nearer to. Since there is no reason why the sound of a pipe should leave traces in their brains, which not at first, but by their after endeavors, should produce the like sounds; and why the sounds they make themelves should not make traces which they should follow as well as those of the pipe, is impossible to conceive."

There is no question that many animals understand the measurement of time. It is a well-known fact that, on lands where the crows are habitually shot at, the birds, instead of keeping at a respectful distance, as on the rest of the week, come close up to the farm-houses on Sundays, having somehow found out that the guns are then shelved. We happened, when staying in Ross-shire with a friend, to meet with a pattern church-going dog. It was a year or two after the conflict in the Scotch Establishment, which led to the foundation of the Free Church, and which, in the first heat of party, occasioned some unfortunate differences in family circles. It did not give one exactly an idea of unity to see husband and wife setting off in opposite directions to their respective places of worship, even though there existed the most perfect harmony of temper, as was the case in the household where I was temporarily located. But this by the way. I was going to observe that even the animals had their special predilections, two of the three Skye terriers being Establishment dogs, and attending their master to the parish church; the other we styled the Free Church dog, for he regularly attended the building lately erected for the secessionists, and where the lady of the house had her pew. The most amusing thing was that the little creature — the shaggiest, most intelligent-looking "Skye" I ever met with — always set off to church by himself, and punctually half an hour before the bell commenced to ring for service. The sight of him trotting leisurely along the carriage-drive was quite sufficient information as to the time of day, without consulting the clock. On reaching the church, we always found him soberly settled in the pew, and he invariably conducted himself with the strictest propriety.

Another specimen of clock-work regularity came under our notice in London, as exhibited in the person of a very large white tom-cat; white, that is to say, he was intended to be by nature, and would have been anywhere else but in the heart of the city smoke. As it was, his coat was of a dingy grayish, yellowish, indescribable tint. This cat came up every morning at seven o'clock to awaken the inmates of the house; mewing and scratching at one bed-room door till he received an answer, and then passing to another in the same way, till he had completed his round. He was very punctual, never being more than two or three minutes behind time.

We hope that the illustrations which we have brought together — a few out of many which could have been given — will interest the reader. We must leave him to draw his own conclusions.

CHARLES DICKENS.

THE *British Medical Journal* says: — "How true to nature, even to their most trivial details, almost every character and every incident in the works of the great novelist whose dust has just been laid to rest, really were, is best known to those whose tastes or whose duties led them to frequent the paths of life from which Dickens delighted to draw. But none, except medical men, can judge of the rare fidelity with which he followed the great Mother through the devious paths of disease and death. In reading 'Oliver Twist' and 'Dombey and Son,' or 'The Chimes,' or even 'No Thoroughfare,' the physician often felt tempted to say, 'What a gain it would have been to physic if one so keen to observe and so facile to describe had devoted his powers to the medical art.' It must not be forgotten that his description of hectic (in 'Oliver Twist') has found its way into more than one standard work in both medicine and surgery."

Charles Dickens, as all writers about him have testified, was so endowed by Nature, that every utterance was sunny, every emotional opinion instinctively right. He communicated to all he did, the delightful sense of ease with power. Prodigal as he was, he seemed ever to reserve more love and tenderness than he gave. His vigor was sustained, as well as brilliant and daring. His mind, so marked in its self-respect and equal poise, was never weak on great occasions, as the judicial mind so often is. There was something in the quality that led him to the right verdict, the appropriate word, the core of the heart of the question in hand. The air about him vibrated with his activity, and his surprisihg vitality. In a difficulty men felt safe, merely because he was present. Most easily, among all thinkers it has been my fortune to know, was he master of every situation in which he placed himself. Not only because of the latent, conscious power that was in him, and the knightly cheerfulness which became the pure-minded servant of humanity who had used himself to victory; but because he adopted always the old plain advice, and deliberated well before he acted with the vigor which was inseparable from any activity of his.

The art with which Charles Dickens managed men and women was nearly all emotional. As in his books, he drew at will upon the tears of his readers: in his life he helped men with a spontaneous grace and sweetness which are indescribable. The deep, rich, cheery voice; the brave and noble countenance; the hand that had the fire of friendship in its grip — all played their part in comforting in a moment, the

creature who had come to Charles Dickens for advice, for help, for sympathy. When he took a cause in hand, or a friend under his wing, people who knew him breathed in a placid sense of security. He had not only the cordial will to be of use wherever his services could be advantageously enlisted; but he could see at a glance the exact thing he might do; and beyond the range of his conviction as to his own power, or the limit of proper asking or advancing, no power on earth could move him the breadth of a hair.

Slow to adopt a cause, Charles Dickens was the first in the battle for it when he had espoused it. Dickens abhorred a sham with his whole soul. When he published his "Child's History of England," the mass took it for granted that the chapters which were appearing in the columns of "Household Words," were so much copy; and that the writing of it for his own children was only a common, and to the world, warrantable artistic fiction. Such fiction was not possible to the greatest fiction-writer of our century. I have his words before me, on this history: and the ink is yellowing fast.

"I am writing a little history of England for my boy, which I will send you when it is printed for him, though your boys are too old to profit by it."

When Ada, Lady Lovelace, was dying, and suffering the tortures of a slow internal disease, she expressed a craving to see Charles Dickens, and talk with him. He went to her, and found a mourning house. The lady was stretched upon a couch, heroically enduring her agony. The appearance of Dickens's earnest, sympathetic face was immediate relief. She asked him whether the attendant had left a basin of ice, and a spoon. *She had.* "Then give me some now and then, and don't notice me when I crush it between my teeth: it soothes my pain: and we can talk."

The womanly tenderness — the wholeness — with which Dickens would enter into the delicacies of such a situation — will rise instantly to the mind of all who knew him. That he was at the same moment the most careful of nurses, and the most sympathetic and sustaining of comforters, who can doubt?

"Do you ever pray?" the poor lady asked.

"Every morning and every evening," was Dickens's answer, in that rich voice which crowds happily can remember: but of which they can best understand all the eloquence, who knew how simple and devout he was when he spoke of sacred things: of suffering, of wrong, or of misfortune. His engaging manner when he came suddenly in contact with a sick friend, defies description: but from his own narrative of his walk with my father, which he told me made his heart heavy, and was a gloomy task, it is easy for friends to understand the patience, solicitude, and kindly counsel, and designed humor with which he went through with it. My father was very ill; but under Dickens's thoughtful care he had rallied before they reached the Temple.

"We strolled through the Temple," Dickens wrote me, "on our way to a boat, and I have a lively recollection of him stamping about Elm Tree Court, with his hat in one hand, and the other pushing his hair back, laughing in his heartiest manner at a ridiculous remembrance we had in common, which I had presented in some exaggerated light, to divert him." Then again — of the same day — "The dinner party was a large one, and I did not sit near him at table. But he and I arranged before we went in to dinner that he was only to eat some simple dish that we agreed upon." Then: "We exchanged 'God bless you,' and shook hands." And they never met again.

To plaster a few of the ills which obtrude themselves unpleasantly upon the attention with checks handed to resounding cheers, is a kind of charity that is strongly spiced with selfishness. The sham of charity-dinner speakers and donors Dickens abhorred. And in like manner, and with like vehemence, he detested slipshod assistance: careless, unreflecting giving. The last time I sat with him on a business occasion, was at a Council meeting of the Guild of Literature and Art. There had been an application from the wife of a literary brother. The wrecked man of letters was suffering from that which would never relax its hold upon him. But it could not be said that his misconduct had not brought on the blow. The firmness and delicacy with which Dickens sketched the case to the Council; passing wholly over the cause, to get at once at the imploring fact upon which our hearts could not be closed, left in my mind a delightful sense of his abounding goodness. He spoke of the wife, and her heroic self-abandonment to her husband, through years which would have tried beyond endurance very many wives; but he begged that the utmost might be done; and at the same time, he remained firmly just. What were the objects of the Fund as laid down in the rules? Did the case come strictly within the limits of our mission? Friendship, sympathy apart, was it a proper and deserving case? The points were argued with the greatest care; and all the time an acute anxiety was upon the face of the chairman. When at length we saw our way to afford the help desired, Dickens's face brightened as he became busy with his minutes and his books, and his secretary who was at hand; and he remarked cheerily how glad he was we had seen our way to do something.

Another occasion thrusts itself through a crowd of recollections. A very dear friend of mine, and of many others to whom liter-

ature is a staff, had died. To say that his family had claims on Charles Dickens, is to say that they were promptly acknowledged, and satisfied with the grace and heartiness which double the gift, sweeten the bread, and warm the wine. I asked a connection of our dead friend whether he had seen the poor wife and children.

"Seen them!" he answered, "I was there to-day. They are removed into a charming cottage; they have everything about them; and, just think of this, when I burst into one of the parlors, in my eager survey of the new home, I saw a man in his shirt-sleeves, up some steps, hammering away lustily. He turned; it was Charles Dickens, and he was hanging the pictures for the widow."

Dickens was the soul of truth and manliness, as well as kindness; so that such a service as this came as naturally to him as help from his purse.

There was that boy-element in Charles Dickens which has been so often remarked in men of genius, as to appear as almost inseparable from the highest gifts of nature. "Why, we played a game of knock'em down only a week or two ago," a friend has remarked to me, with brimming eyes. "And he showed all the old astonishing energy and delight in taking aim at Aunt Sally."

My own earliest recollections of Charles Dickens are of his gayest moods; when the boy in him was exuberant, and leap-frog or rounders were not sports too young for the player who had written "Pickwick" twenty years before. To watch him through an afternoon, by turns light and grave; gracious, and loving and familiar to the young; apt and vigorous in council with the old; ready for a frolic upon the lawn, as ready for a committee meeting in the library; and then to catch his cheery good-night, and feel the hand that spoke so truly from the heart — was to see Charles Dickens the man, the friend, the companion and the counsellor all at once. It wanted such a man as Dickens was in his life, to be such a writer as he was for the world. He drew beauties out of material that to the common eye was vulgar, unpromising stuff.

That he found greater pleasure in selecting and marking out figures where the traits were less smoothed or effaced by the varnish of polite society, than in picturing those of a world where the expression of individual characters become less marked, is true. To each man his own field. An essay could be recalled written to prove that Scott was a miserable creature, because his imagination delighted in the legends and traditions of feudal times, with their lords and their retainers. And yet Scott gave us the fisher-folk in "The Antiquary," and Jeannie Deans. But though as "a man of the people" Dickens loved to draw the people in all their varieties, and humor, and incomplete ambitions, — and though he was by nature and experience a shrewd redresser of abuses, — tracing them back to their primal causes, — he was in no respect the destroyer it was for awhile the whim of fools of quality, and the faded people who hang on their skirts, to consider him. One who redresses grievances is not, therefore, an overthrower of thrones. The life and work of Dickens expressed a living protest against Disorder, — no matter what the Order.

Signs of the end, and that he knew the end was at hand, are multiplied day by day; and they are so many marks of the love of order, that was a ruling passion in Dickens from beginning to end. That he had misgivings, warnings, we cannot doubt; and these led him to prepare for the change. Only a few days before his death he transferred the property of "All the Year Round" to his eldest son, and formally resigned its editorship.

He was walking with a dear friend of his a few weeks ago, when this one said, speaking of Edwin Drood, —

"Well, you or we are approaching the mystery — "

Dickens, who had been, and was at the moment — all vivacity — extinguished his gayety, and fell into a long and silent revery, from which he never broke during the remainder of the walk. Was he pondering another, and a deeper mystery, than any his brain could unravel, facile as its mastery was over the hearts and brains of his brethren? We can never know.

It is certain, however, that the railway accident on the ninth of June, 1865, in which Dickens so nearly lost his life, made an ineradicable impression on him; and that when he referred to it, he would get up and describe it with extraordinary energy. He closed his last completed work with a reference to it. "I remember with devout thankfulness that I can never be much nearer parting company with my readers forever than I was then, until there shall be written against my life the two words with which I have this day closed this book — THE END."

From an article by BLANCHARD JERROLD.

HOPE.

HOPE brightens every youthful scene,
And crimsons every sky;
It paints with beauty every cheek,
And gladdens every eye.

The lover's smiles, the maiden's dreams,
The heights of power and fame,
The valiant deeds of future years,
The honors of a name,

Hope's wondrous presence all declare,
And speak her magic spell,
To trance the soul with visions bright,
And darksome fears dispel.

CHARLES NAISMITH.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

GYMNASTICS.

I.

ON the subject of Physical Culture very little is known by the people at large; and what is known is far from being rightly appreciated. People in general take little or no interest in any subject which more immediately concerns their health, until once they are conscious of having lost it, when they ate only too anxious for its recovery. That a very large number of the disorders of the human system which afflict mankind are due to careless and culpable indifference, or to ignorance of the laws of life, there can be no question. Everywhere the physical laws of our being are violated, and the sufferings incident to such violation most likely charged to *Providence*, while the sufferers, now anxious for restoration to health, but unwilling to follow the laws of nature and await *her* healing processes, resort to DRUGS, the *patent and quack remedies* which flood the land, and thereby not unfrequently perpetuate their sufferings and materially shorten their lives; in plain English, DRUG THEMSELVES TO DEATH.

No one who has paid any attention to the subject of *Physical Culture*, can doubt that the right use of properly-regulated exercise must have a most beneficial influence, not only upon the due development of the human body, but as a sanitary measure in preventing certain forms of disorder, and in many cases as a curative process.

In a previous article, the theory of motion as applied to the mechanism of the human body, was dealt with, and the application of certain principles to one of the simplest forms or modes of animal motion, namely, to walking, was spoken of.

Walking ought to consist of a succession of steps, not of leaps, which constitute running. Fair walking is generally called "toe and heel," and one foot should always be on the ground. The steps are taken as much as possible from heel to heel, which part of the foot must touch the ground first, and be firmly dug into it. The ball and toe of the foot should not be on the ground for any perceptible space of time; if they are dwelt on, the walker loses a certain amount of time in each stride, besides causing the knee to bend by bringing the weight of the body on the toes, which are unable to bear it. The latter point is one of the great differences between running and walking; in the former all the weight of the body is thrown on the toes and balls of the feet, and in the latter on the heels.

At each stride the loin and hip corresponding to the leg which is being put forward, should be twisted well round, the right loin and hip towards the left, and the left loin and hip towards the right. By this means the walker is enabled to put his feet down almost in a geometrical straight line, one in front of the other, and thereby gains additional length of stride. As regards the upper part of the body, the arms must be kept well up and inclined outwards from the chest, with the elbows slightly bent, — since in fast walking the arms perform almost as important functions as the legs. Each arm must be swung across the chest, and the shoulder well lifted at the same time in unison with each alternate stride. The object of this motion is to raise the weight of the body off the heels, and thereby enable the legs to take a quicker stride. Above all things the shoulders must be kept well back, the chest out, the whole body

as upright as possible, and the knees perfectly straight.

As an exercise for bringing into play all the muscles of the body, no single exercise can equal it, since in fast walking, not only the muscles of the feet, legs, and loins are used, but those of the ribs, chest, shoulders, and also arms, while they work across the body. Nevertheless there are acts much more complex, and which require a more prolonged training than mere locomotion.

Many of these movements involve the simultaneous or successive action of various groups of muscles, and each of these groups must be trained to take its appropriate portion of duty. Many of them also require great speed in their performance, others again great force, and sometimes both are necessary, but it may be safely assumed that if such be the case, *i. e.* if both speed and force are necessary, the stage of training requisite for the due and proper performance of the action will become of necessity more important and more lengthy. Herein lies the difference between the labor of a skilled mechanic and a raw apprentice. But, besides special training for special efforts, it is nowadays well recognized that, for the human body to attain its greatest beauty and its greatest power, it is necessary to train not one set of muscles, or even several sets, but all in turn, and it is on this account that gymnastics have of late years received the attention they have, not only as a means of physical or bodily education, but as a sanitary measure, and actually as a method of curing disease. Both of these subjects we shall consider in turn; but we shall first speak of the preparatory process, or that of training.

By all nations in a comparatively rude state of civilization, feats of strength are highly esteemed; and among those which have attained a higher stage, strength, when combined with skill, is still valued and respected. Among the ancients, both Greeks and Romans, games of strength and skill were frequent. But then, as now, to a candidate for popular favor a prolonged stage of training was necessary before he could hope to attain to eminence; hence there arose a class of trainers for such exercises. Gradually the plan adopted by these men grew into a system, merely from experience, not from any scientific notions, and it is this system we have to examine.

If a man sets about any unusual exertion, say running a race, he will soon become painfully aware of the efforts required to keep up his circulation and his respiration; his heart will thump against his side, and his breath come thick and fast; whereas a man by his side may be going along as quietly and as easily as possible, but then he has been trained. We have shown how scientific mechanical principles may be brought to bear on human movements, how the muscles act on the bones as levers, how the muscles themselves may be likened to a steam engine. But to enable this engine to do its work, fuel is necessary, and this is supplied by the blood; if, therefore, the engine is called upon to move faster than usual, more fuel will be necessary, and the blood will require to be driven more rapidly through its textures. But as the blood soon becomes fouled with the products of its combustion, it requires renewing, and air must be admitted more rapidly into the lungs to carry off the foul gases produced. Hence increased muscular action implies a more rapid circulation of the blood, and a more frequent breathing than are ordinarily required. This, then, is the scientific basis on which we have to proceed.

Trainers of the olden times supposed they had to contend against a fearful and a concealed enemy which they called *inward fat;* and it was to dislodge this formidable antagonist their efforts were chiefly directed. It was this, said they, which impeded respiration and circulation, which made a man puff and blow, and made his heart kick against his side. So far, no doubt, they were right, for fat will accumulate internally as well as outwardly, and especially may the heart so become affected, although this is not the dread foe to human life about which medical men talk, for there is another

form of fatty heart, where the very texture of the muscle of the heart is turned into fat, and there is so little hope of training a man with such a heart to become an athlete, that the quieter he keeps himself the better for his life. Nevertheless, fat may accumulate, and so render the action of the heart less effective, but this is not the true explanation of the difficulty of breathing experienced by men suddenly called to unwonted exertions, for it occurs equally to fat men and to lean.

Every one is familiar with the fact that a man's bodily conformation materially depends on his employment; hence the strong sledge-hammer arm of the blacksmith, the horny hand of the shoemaker, and so of a variety of other occupations. For the human body is so constituted, that if any part is called upon for unusual exertion, this exertion implies more rapid change of the blood in its parts, as well as a more liberal supply of that all-necessary fluid, which in its turn insures increased growth and bulk of the part. Thus, therefore, in a healthy individual increased exertion implies increased bulk and increased capacity for exertion. This is the basis of the training system, and the basis applies equally to external and internal organs. If any of a man's muscles be suddenly and unexpectedly called upon to perform some duty to which they are not accustomed, whether raising a heavy weight from the ground, throwing it from one spot to another, running or leaping — in short, any unwonted exertion — they will fail to perform it as satisfactorily as those which have been trained to their work. Further, the exertion will leave behind an uncomfortable soreness, which may last a day or two, indicating that the parts have been strained in performing this novel duty; but should the exertion be persevered in, the sense of soreness will become less and less till it entirely disappears; the exertion required to perform the act will also be less and less, for the muscles will be strengthened by each new exertion, until finally they will perform their duty easily and satisfactorily.

But what applies to the outer parts of the body also applies to the more internal, for the heart, whereby the blood is circulated, is a hollow muscle, and the principal forces whereby respiration is effected are also muscular. Now, a man's heart and his respiratory muscles may be good enough for ordinary purposes, he may have no difficulty of breathing, nor any inconvenience of circulation, and yet if any extraordinary exertion is required, both heart and lungs may fail to do their duty in their usual quiet and imperceptible fashion. The cause of this will be readily intelligible from what we have already said — both the circulatory and the respiratory apparatus require training if they are to be called upon for any special efforts, just as with the more external muscles of the body.

A proper system of training must accordingly be one which provides for the due exercise of all the muscles, voluntary, respiratory, and circulatory, but it should also imply a diet best suited for the development of the muscles, that is the formation of hard flesh, not of fat, for fat is not only useless, but injurious, from a trainer's point of view. Now, in the olden time, men were fed on half-raw beefsteaks (biftecks sanglants, as the horrified French restaurateurs call them) with a small proportion of stale bread and certain vegetables. No beer or spirits of any kind were allowed. No doubt, in the main, this process was correct, for the meat would be the best thing to nourish the muscles, that is to say, to supply the waste of the engine; but it is not the best thing for fuel, for some other article of diet should be used as well as bread and meat, otherwise the system is sure to suffer.

Diet no doubt constitutes an important portion of any system of training; by it alone, bodily changes of considerable importance may be effected, but by it alone we cannot develop our muscles, or give the frame unusual power and endurance. For this, exercise is necessary. As we have again and again said, increased action implies increased waste, but also more speedy growth as well as greater development,

whence its value in a system of training. But exercise to do good should be systematized, and that nowadays has been done, the system constituting what is called Gymnastics. We have said a *system*, for gymnastics, except undertaken systematically, are useless. Further, we have pointed out that gymnastics should be employed for three special objects: as a means of educating the body; as a sanitary measure to prevent certain forms of disorder; and as a means of cure in certain other forms. Then, again, according to the end in view, the character of the exercises should vary, and accordingly we have two systems to deal with, known respectively as *light* and *heavy* gymnastics.

Exercise, although the fact is too often overlooked, is really one of the necessaries of life. Man has been condemned to earn his bread by the sweat of his brow, but in return his labor has been blessed to him, for thereby his body is strengthened, his happiness increased, and his life prolonged. There are, no doubt, many employments inimical or injurious to health, but of the fundamental fact that exercise is good for the animal frame there cannot be a question. There are two great motives or inducements to exertion; these are, the necessity for eating and the love of offspring, and of these two the former is undoubtedly the stronger; but, as bearing on our subject, it is interesting to note that where little or no exertion is necessary to procure sufficient food, just as where a supply large enough for ordinary wants cannot be obtained even with great exertion, the human race is of an inferior kind. It attains its maximum development where food is plentiful, but where it is necessary to work hard for it. Neither the negro, who can obtain a livelihood with scarcely any trouble, nor the Esquimaux, who can hardly procure one at all, can be compared in bodily or mental vigor with the American or the European.

But in many occupations under our system of civilized or divided labor, certain parts of the body are called into play to the exclusion of others; and it should be the special function of gymnastics to remedy this tendency to unequal development. No one who, especially in our large towns, has had occasion to examine the chests of a number of individuals — a process the necessity for which in hospitals is painfully frequent — can have failed to be struck with the multitude of badly formed busts and undeveloped bodies which come before him. Now, for these, in many instances, a process of physical education would be their salvation. Unfortunately it is not always to be had, for *skilled* masters in this department are much rarer than in those which relate to mental growth.

Then, again, with reference to another and perhaps a more interesting matter still, mammas constantly complain of the difficulty they have in getting their darlings to sit upright when they come to the age of fifteen or sixteen. Only the other day we were asked what should be done with a young lady who would not sit upright; our reply was unhesitating — 'Let her have a course of light gymnastics.' Some of our fair readers may remember their sufferings under the old system — not altogether, we are afraid, banished even now — of back-boards; and bearing in mind their hours of penance in them, they may desire to avert such troubles from their daughters: to these also, we say, "Substitute Gymnastics." Growth at the period of life of which we speak is remarkably rapid both in boys and girls; they shoot up and become tall and lanky, they want filling out, and are troubled with growing pains. Even men, when tall and thin, are seldom very erect, their muscles are too weak; and there is only one way of overcoming this weakness — by exercising them. Strengthen the muscles, and the drooping shoulders and semi-erect gait will disappear.

Muscles are intended for interrupted, not continuous, action; give them intervals of rest, and they will go on acting, we had almost said forever. But, it may be objected, there is the heart, which you have told us is really a hollow muscle; were it to cease to act, we should die. No doubt this is true

in one sense; were it permanently to cease to act, undoubtedly we should die, but it is not continually contracting, it alternately contracts and expands, action and repose succeed each other even in the case of the heart, and still more should this be so with other muscles. To place a child upright against a straight board, or even on a music stool, without any support, is not to give the muscles free play, but rather to confine their effect to a rigid and unyielding fixation of the body. Here it is all action and no repose for certain muscles, all repose and no action for others, and this is the very thing to be avoided,— uniform development, the result of uniform exertion, is that at which we should aim.

One of the most serious features of life in the present age, is the rate at which men of action live in the great crowds which constitute our modern cities. The numerous inventions which have enabled us to vanquish time and space, have entailed on us the necessity of living fast, to use the word in its plain sense. He that would win the race of life must be at least as speedy as his fellow competitors. So much depends nowadays on education, both general and special, that parents are encouraged to force, as it were, the intellects of their children. A boy that is fond of his books is favored over his roughier and hardier fellows, who prefer exercise in the open air to study; perhaps in our modern civilization this is natural, but there can be no doubt that when carried to any great extent it is prejudicial. For a man to fight well the battle of life, nothing is more essential than a sound mind in a healthy body, but to insure a healthy body nothing is more needful than a due indulgence in the healthy sports of childhood, a due proportion of bodily, as contradistinguished from mental, exertion in boyhood and manhood. The fine physique of the English nation is no doubt to some extent due to their partiality for out-door sports, and doubtless also the effect reacts on the cause. All this only serves to illustrate our thesis, which is that education of the body is as necessary as education of the mind, and that the powers of the one should be cultivated alike with the powers of the other.

For of all these purposes gymnastics is the instrument we propose to employ; not gymnastics in the sense of such exploits as those of Blondin, Leotard, and the thousand-and-one nameless performers who alternately delight and horrify their eye-witnesses — we cannot call them audiences — but gymnastics in the sense of a system of physical education. Now it is quite clear that the exercises which would be calculated to fit a strong and hardy man for the boat race, would be altogether unsuited for a gentle and tender girl who had a tendency to stoop. Hence it is good to speak of light and heavy gymnastics, the former adapted for the weaker class of learners, the other for those of stronger frames and more mature years. Further, we may classify gymnastic apparatus into movable and fixed; and we may deal with exercises specially intended to develop the upper parts of the body, and exercises specially intended to develop the lower limbs, as well as those which affect both.

As already pointed out, every judicious series of exercises will imply a training of the organs of respiration and circulation. Walking and running are those which perhaps most readily effect this, as they do not interfere with the upper limbs, and hence they are chiefly employed for improving "the wind" as it is called, for when the arms are brought into play for any powerful effort, say pulling at or lifting a heavy weight, if there be great resistance, the looker-on will speedily observe the performer become redder and redder in the face till he is almost purple. The reason of this is, that the muscles of his arms having proved insufficient to effect the removal of the body causing the resistance, he has called a new set of muscles into play by fixing his chest, so that during these powerful efforts no breath can be taken. Consequently, as the blood is rapidly undergoing change in the rigid and contracted muscles, and as the heart continues to drive the blood thus

fouled through all parts of the body, it not being aerated by passing through the closed lung, the surface darkens, and the blood which should pass through the lung accumulates outside it, the two together producing the reddening and darkening of the features. This is straining the lung, not exercising it; it is equally injurious to both lungs and heart, for both are alike strained, the lungs to resist, the heart to drive on, the blood current. Hence, for gymnastics of the lungs and heart, exercises which do not involve the upper limbs should be selected.

CONFECTIONERY.

"CONFECTIONERY, ugh!" says Fogie, as he opens the present number, "what is the use of bothering about sweets? Why not be useful, and let us first look into bread and the necessaries of life? In my opinion, the worse the sweets are, the better, as there would then be fewer squalling brats in the world!" But it is in the interest of these children that we take up the subject, seeing that the child is father to the man, in a hygienic as well as in a psychological point of view. Then again, sweets are undoubted necessaries of infantile life; for what would the nursery be without those lollipops of tempting color and delicious flavor, at once so useful and so troublesome to the domestic authorities? How many times is the noisy and petulant youngster lulled to peace by the spreading out of a sweetmeat feast? But yet, when Uncle John comes to see Tommy, and tips him half a dollar, which is spent at the confectioner's shop within three days, think of the mother's anxiety, for she well knows that such visits invariably end in "the powders as before," and "the castor oil in the morning." It is not to be denied that an overdose of pure sugar will itself cause some of the ills to which infantile flesh is heir; but why is it that, after eating a few only of these beautifully colored sweets, our child should always suffer the pangs of colic, although he often surreptitiously abstracts twice the quantity of loaf sugar from the cupboard, and is none the worse for it? The answer has already been given by many authorities, to the effect that there is no more unblushing and licensed poisoner in the world, than the unscrupulous manufacturer of cheap confectionery. It is a well recognized fact that it is possible to produce colored sweets without employing any deleterious mineral ingredients, but the cheapness and pigmentary power of the latter are considerations which easily overcome the conscientious scruples of these gentlemen, if indeed they really possess a conscience at all in matters pertaining to their trade. We propose to take up the various colors in the order of their popularity, and simply to classify them into six groups, namely, red, yellow, blue, brown, green, and white, without distinguishing them exactly by shades. Our results will be gathered from the examination of one hundred and five samples of various kinds of sweets, both cheap and dear, purchased at random.

1. *Red colored Confectionery.* — We find that this color is the most popular of all, as, out of our one hundred and five samples, thirty-three were of a more or less roseate hue. In the eating of this class of sweets, the consumer does not run so much danger, as the harmless red pigments are more useful to the confectioner than the poisonous ones, unless he desires to produce a bright scarlet. In France, where the coloring of sweetmeats with poisonous matters is sternly discountenanced, lists are published for the guidance of confectioners, and this example we propose to follow without going very deeply into minutiæ.

Summary of red coloring Matters.

ALLOWED.	FORBIDDEN.
Cochineal,	Vermilion,
Madder,	Red Lead,
Brazilwood,	Reddle, etc.,
And their various lakes and other modifications.	All mineral reds, Aniline reds.

Of the twenty-seven samples actually examined, one only was colored with lead, and three with vermilion, which is a preparation of mercury, and, consequently, very deleterious.

If we followed our usual custom, we should now treat of some popular modes of detecting the various red mineral pigments, but we intend to depart in the present case from this portion of the subject. Our reason for this is, that to give even the most popular instructions, would involve suggesting the employments of acids and other corrosive and disagreeable re-agents. Besides, all such investigations can only be carried out with reliability in a proper laboratory by trained persons, and to suggest to them what to do in such a matter would be a work of supererogation. We will, therefore, simply say, that a red colored sweet, dissolved in water, should not leave a scarlet tinted powder at the bottom of the glass.

2. *Yellow colored Confectionery.* — These sweets are worthy of our attention, because they are only second to the reds in popularity, while they far exceed them in danger. A pure yellow colored sweetmeat should be tinted with nothing but a vegetable coloring matter, such as turmeric; gamboge being, however, forbidden on account of its cathartic properties.

The following is a summary of the yellow colorings: —

ALLOWED.

Turmeric, Persian Berries,
Fustic, Saffron.
French Berries.

FORBIDDEN.

Chrome Yellow (Lead Chromate).
Imitation " (Barium ").
Naples " (Antimony Sulphide).
King's " (Arsenic ").
Massicot (Lead Oxide).
Gamboge.

Out of the one hundred and five samples of sweets purchased, twenty-three were found to be colored yellow.

Thirteen out of the whole twenty-three were actually poisonous, and contained lead in a most deleterious form. Some of the sweets were only colored on the surface, but all the lozenges and similar comfits were completely impregnated with the poison.

We trust that it will not be considered as travelling out of our province if we give, for the benefit of our sensation-loving readers, a short detail of the symptoms which might be expected to appear in a person consuming a considerable portion of these treacherous lozenges. We take this from the mouth of a medical friend, who had seen a case in point, in which the sufferer had daily partaken of highly-colored ginger lozenges in large quantity, to allay flatulence, as he fancied. The commencement of the action of the poison manifests itself in sudden attacks of excruciating pains in the bowels, and other signs of what is known as *painters' colic.* The patient becomes worn and thin, while tremblings of the hands and pains in the legs and feet follow. At last it becomes impossible to hold anything, or to stand without assistance, and a kind of paralysis sets in, characterized by what is called "wrist drop." The patient is now a pitiable sight, with his hands hanging like inanimate masses of flesh at right angles to his arms, without the power of raising them; while a well defined blue line is visible all round his gums, and, if relief be not obtained, a miserable death soon follows. Such then is the risk to which we expose our children, in permitting the use of chromate of lead as a pigmentary matter in sweets. Many children are at this moment suffering the torments of this colic, and having their cries stilled by gifts, on the part of their tender though foolish mothers, of the very matter which is ruining their health, and embittering what should be the happiest portion of their existence!

As to the detection of poisonous yellow comfits, we will refer to our remarks on the reds, and simply say to our readers that they ought not to permit the use of yellow comfits in their families at all; but, if they do so, they must especially beware of those which, when dissolved in water, leave behind a distinct heavy bright yellow powder at the bottom of the glass.

3. *Blue colored Confectionery.* — Twelve samples out of the one hundred and five were colored blue, so

that this tint is evidently not so popular as the ones already considered. There is only one blue pigment which should be permitted to be used, and that is indigo, while the following is the *list of colorings which ought to be prohibited:* Ultramarine; Blue Verditer; Prussian Blue; Cobalt Blue and Smalts; and all modifications of these pigments.

Out of twelve samples six were colored with deleterious pigments, which, although not as a whole so actually poisonous as the yellows, yet are still far from pleasant additions to our food.

4. *Brown colored Confectionery.* — These sweets come next in popularity, as there were twelve brown samples. The color is usually produced by the use of some brown earthy matter containing iron, and is not as a rule very actively deleterious. However, it would be better to forbid the use of brown pigments altogether, and only permit this tint to be communicated to sweets by the use of chocolate, coffee, or some such matter. Of the twelve comfits examined, seven were so colored, the rest being principally tinted by umber.

5. *Green colored Confectionery.* — This tint, although pretty and attractive, is evidently not popular, as only five of the one hundred and five samples were green. It would therefore seem that the great number of warnings which we have had, from time to time, as to the danger of such pigments, have caused the public to become shy of them. This has not been without good cause, seeing that nearly all the mineral greens contain copper, while the brightest one (Scheele's green), superadds the charms of arsenic to those of the former sufficiently dangerous metallic poison. The only green permitted to be used should be a mixture of indigo and a vegetable yellow, such as turmeric. Sap green is also allowable when unadulterated by any mineral matter, which is, however, a very uncommon circumstance. The following greens ought to be strictly forbidden: Verdigris; Scheele's Green (copper arsenite); Brunswick Green; Zinc Green (zinc and cobalt).

All the green confectionery was found to be colored with one or other of these poisonous ingredients. We therefore counsel our readers to stick to their abhorrence of green sweets, and never, under any circumstances, to allow such comfits to be used in their families.

Having thus glanced at the principal classes of colored sweets in their turn, we must now take a short survey of the uncolored. These were twenty-three in number, and consisted of sugar mingled with gum, starch, and sulphate of lime, and flavored with various essences. There was nothing actually poisonous found in any of them, but in some the proportion of lime was very large. Carraway comfits are extensively adulterated, and also many of the peppermint lozenges. The bases of both these, coriander and almond comfits, are flour and terra alba; after the seeds are put into the pan, a little syrup is thrown over them, and that is dusted over with either flour, whiting, or plaster of Paris; a strong coat is put upon them in this way, and then they are finished with a stronger and better syrup. Our analyses of the white samples, which want of space compels us to omit, bears out these statements.

Another important matter is, the flavoring by artificial essences. The rapid strides with which the chemistry of the various hydro-carbons and their derivatives has advanced, has made it possible to imitate almost any fruit flavoring. The artificial essences are for the most part ethereal salts, or, more popularly, compounds of an ether with some organic acid such as vinegar. As these compounds can be obtained in much greater quantity and at a much lower price than real fruit essences, their use by the confectioner has now become almost universal. We are not aware that any real researches have been made as to the exact physiological action of these compound ethers, but we have seen it asserted that sweetmeats so flavored can produce drowsiness and stupor. We trust, however, to present our readers, at no very distant date, with the results of a careful series of experiments on animals, now

being conducted. But besides the innate danger which must exist in these substances when too freely employed, there is superadded the peril of careless manufacture. The essence of bitter almonds is a good instance of this, as it almost invariably contains a large quantity of prussic acid; and so well is this known, that many persons desirous of commiting suicide or murder, and not being able to procure the pure acid, have availed themselves of the poisonous qualities of this essence, to effect their deadly intentions. It is of course seldom that a sufficient quantity of the essence is employed to produce death from eating almond flavored sweets; but when we consider the activity of the poison, and the consequences which might follow careless and insufficient mixing, we see the risk which we daily run in the use of this flavoring. Among our samples there was one case in point. The sweets in question were shaped like large sugared almonds, but destitute of the usual interior, although the odor and taste were most powerful. They were found to be masses of sugar and sulphate of lime, slightly tinged on the surface with chrome yellow and red lead and very highly flavored with essence of bitter almonds. On dissolving and submitting them to distillation and the usual tests, such a decided trace of prussic acid was found, that there was nobody in the laboratory bold enough to try the effect of eating a dozen or two, for the sake of experimenting on their poisonous powers. We suspect this was a case of the essence not having been properly distributed through the whole pan of sweets.

And now what do our readers say to the picture presented? It has been in no way varnished up, nor has any attempt been made at sensation, as our collectors were boys sent out to buy what sweets they liked best, by which means we thought the confectionery most in demand by children would be procured. Admixtures which amount to nothing more than petty frauds on our pockets, sink into obscurity when placed side by side with the wholesale adulterations practised on our infants. We have many strong-minded ladies now, who take a high interest in social affairs, and to them we commend this subject. It is one which would at once be graceful, and more suited to their status in society, than some other matters which have lately engaged their attention. Who is a more natural protector of her children than a mother? unless, indeed, like Mrs. Jellaby, she is too strong-minded and literary to attend to them. But we hope there are, after all, few Mrs. Jellaby's in the country; and we therefore appeal with confidence to the ladies, to use their influence with the lords of creation, so that a law may be made to prevent their little ones being daily tempted to purchase and eat chromate of lead, vermilion, Brunswick green, and prussic acid. It may be argued that the minute quantity employed renders the poisons comparatively harmless; but let us remember the small and delicate little organisms into which the bulk of the sweetstuff is intended to pass, as well as the fact that lead arsenic and most of the pigments used are cumulative poisons, which do not leave the system, but go on collecting force, as it were, for their fatal work from each replenishment. With the influence of the ladies and mothers on our side, one of the great objects of this Journal cannot thus fail to be accomplished.

From "Food Journal."

The American Dental Association who have thus far been heard from, agree in the assertion that plates made of rubber and worn in the mouth are injurious. Indeed, these plates are called "rubber" merely by courtesy, for they consist of thirty-six per centum of mercury, twenty-four per centum of sulphur, all the rubber in them being the remaining forty per centum. Most of the dentists agreed that unbolted flour should be eaten, especially by children, instead of the fine white flour generally used, as the parts of the wheat thrown away in the process of bolting are bone producing, and possess other valuable qualities.

THE NERVOUS SYSTEM AND VISION.

By means of our eyes we gain a certain kind of knowledge of things at a distance, as well as immediately around us. Sight we are accustomed to associate with the existence of those organs. Where the latter are wanting, we conclude that the former, considered as a sensation, is absent. The world, we know, is dark to the blind; but are we justified in believing that, what is true of them in this respect, is equally true of all animals lower in the scale of being? Where a special organ of sight is not developed, must we infer that vision is impossible?

Some animals have no localized organ of digestion, but this process is carried on as well in one part of the body as another; and the same is true, as we have seen, in regard to other functions. If we study the power of vision in the various classes of the animal kingdom, we shall find that, like digestion, it becomes remarkably general in its nature. Some have eyes on the head alone; others have them only on the hinder portions of the body; in others they are limited to the head and thorax; in others they extend from the head to the tail; and in others they are entirely wanting, but the whole surface of the body appears to be sensitive to light.

Man himself, in certain conditions of his nervous system, resembles the lower animals in these respects, and acts independently of his usual organs of sight.

We must not, however, infer that the degree of development of the eye depends on zoölogical position entirely, and conclude that beings low in the scale necessarily have imperfect or indistinct vision. The naturalist knows that structure and habit are intimately connected with one another, and that the wants of an animal are, as it were, photographed in itself.

Sight gives us a knowledge of the color, form, size, and position of objects; yet animals, agreeing in the degree of development of their eyes, differ greatly, even when first introduced into the world, in their power of perceiving those properties of matter. The direct inheritance of the ability to use certain organs perfectly seems to depend on the early wants of animals. Each is adapted to the circumstances in which it is placed.

The chick and the young partridge, which inherit the faculty of walking, find their way through the most intricate paths, avoid obstacles, and run in a direct line to food that they have discovered, as soon as they leave the egg-shell. They show immediately a true appreciation of color, distance, and form of objects. Correct perception is inherited by them, just as the powers which a trained hunting-dog has acquired through instruction, are often transmitted to his descendants.

On the other hand, the infant, which, on account of its imperfect bodily development, needs tender care for many months, though born with a certain degree of ability to judge of its surroundings by the aid of sight, evidently obtains most of its knowledge of the distance and size of objects through experience. In it the sense of touch is an important auxiliary in modifying or confirming the impressions made on the mind through the eyes. Every one has observed the disappointed look of infants when attempting to grasp something far beyond their reach. Touch seems to be the first aid in this education of the eyes, but later, no doubt, a correct idea of the distance and size of an object is obtained by noticing the peculiarities of intervening objects, especially those depending on light and shade; and possibly something may be unconsciously inferred from the necessary adjustment of these organs according to distance.

Some who have written on this subject have contended that the power of judging of form, size, and so on, is instinctive or directly inherited by the new-born child, though its actions seem to prove the contrary, because this faculty is beyond dispute directly

transmitted in many of the lower animals. They cannot believe that what in one case is inborn, may be in another the result of education.

No one, however, has contended that the infant is at first *able* to walk alone; though generally carried for months in its mother's arms; yet this would be a natural deduction if we followed the above mode of argument, for, as we all know, many animals have this power independently of training or experience.

Objects appear differently to different persons. Not all see alike in the physical as well as in the moral world. There are many, and the number is greater than is generally supposed, whose eyes are more or less insensible to colors. Some recognize only black and white, and an indefinite number of intermediate gradations. The pleasure which we derive from the sight of the varied and contrasting tints of objects around us is denied to them. They live in a world of light and shade; and even the creations of their imagination must conform to their experience.

Some confound red with blue, brown with green, dark red with dark gray, and so on. In short, there is every degree of this lack of correct perception to be met with; and in the majority of cases it appears to be in no way connected with diseases of the organs of sight.

Achromatopsy, as this insensibility of the eye to colors is called, sometimes runs in families, and becomes hereditary; hence it is that often persons having this defect of vision become quite advanced in years before discovering it; those with whom they are most familiar seeing things always in the same light as they do. It is only when residing permanently away from their near relations, and finding themselves alone and unsustained in their judgment in regard to certain colors, that they begin to suspect that they have been living in a world, as it were, very much of their own making.

Color-blindness may be temporarily caused by the action of certain drugs, or it may be induced by a disordered liver or stomach; and there is more truth than fiction in the common remark that the world appears sad and gloomy to one whose digestion is out of order. The dyspeptic, from physical necessity, casts a shade over all things, and his evil generally begins not with his mind, but with his body. His ideas are colored by the glasses that he looks through, and it is folly for his friends to expect him to take more cheerful views of life. Imperfectly assimilated food can produce and nourish only bodily and mental imperfections.

If we descend to the lowest forms, we find many infusoria which have neither eyes nor nerves, and yet it is easy to see that they are sensitive to light, for they either seek or avoid it.

Since the perception of light does not always depend on the presence of eyes, may not the recognition of objects be possible without the aid of organs capable of forming images of them?

Among the lowest forms of life, where every vestige of an eye disappears, we are forced to admit that some of them, at least, possess more than a power of merely discriminating between light and darkness. They select their food with all the care of animals higher in the scale of being; they recognize the approach of enemies or friends, and avoid obstacles to their movements. In these microscopic forms there is little specialization of parts or functions. Any one portion of the body possesses potentially the qualities of the whole, and may not this in a measure account for the absence of nerves and eyes? or rather, may we not look at the whole surface as an eye?

We can satisfy ourselves that it is possible to see objects without having an image of them in the eye, by looking through a deep blue glass toward a bright sky. We then distinctly perceive the corpuscles of the blood rushing by thousands through the minute vessels of the retina. Here there is sight without the aid of the converging or image-forming apparatus of the eye. The cornea, lens, and humors are all in advance of the object seen, and

yet the blood-disks, coursing rapidly through the vessels of the anterior part of the retina, are seen, if we may so speak, by its posterior sensitive portion.

"When a special sense fails in man, the general sensibility may partially replace it." "I have known several instances," says Abercrombie, "of persons affected with that extreme degree of deafness which occurs in the deaf and dumb, who had a peculiar susceptibility to particular kinds of sounds, depending, apparently, on an impression communicated to their organs of touch or simple sensation. They could tell, for instance, the approach of a carriage in the street without seeing it, before it was taken notice of by persons who had the use of all their senses."

On the Intellectual Powers.—Kruse, who was completely deaf, nevertheless had a bodily feeling of music; and different instruments affected him differently. Musical tones seemed to his perception to have much analogy with colors. The sound of a trumpet was yellow to him; that of a drum, red; that of the organ, green, etc.—(*Early History of Mankind*, by J. B. Taylor.) In his *Reminiscences of the Opera*, Mr. Lumley tells of a friend who used to compare the voices of the different celebrated singers to different colors, distinguishing them so. It is an old saysing of a blind man that "he thought scarlet was like the sound of a trumpet."

Many years ago, the distinguished philosopher Spallanzani ascertained that bats, when blinded, fly with as much ease and precision as when having the use of their eyes; for they avoid all obstacles in their way, turn corners, pass through narrow fissures, and in no respect differ in their flight from bats which have not been so treated. These observations have been confirmed by later experiments.

It is fully established that somnambulists go wherever they please without hesitation; read and write, and give ample evidence of a power of perception apparently independent of the usual organs of vision. In persons subject to attacks of catelepsy, the organs of special sense are often totally inactive, and their functions seem to be performed by other and distant parts of the body. Such eminent physicians as Petetin and Despine have published full accounts of many such cases that came under their own observation.

The relation of the general sensibility to the organs of vision, and to the nervous system, is nowhere more easily studied, or more interesting, than among the Radiates.

Among all classes of beings, at times, and under certain influences, not only the general sensibility fails, but even the organs of special sense cease to be influenced by their ordinary stimuli; and animals, though lying in appearance dead, retain potentially all the energies of life. Extremes of heat, cold, and dryness, or scarcity of food, produce this condition, which in some may last probably an indefinite length of time, provided the inducing causes remain unchanged.

Though vastly superior in intelligence, it cannot be expected that man should be entirely exempt from the forces which act on, and, we may say, mould animals lower in the scale. The same organized tissues compose his body; he begins at the same point, and passes through identical stages of development with many of them. When living under influences which more nearly approach those constantly acting on the brute creation, and unrestrained by the circumstances which civilization has brought about, we not only find that he reverts in physical form and structure toward those of the beings below him, but that he occasionally, as we have seen, exhibits those compound modes of development that are frequently noticed among vertebrate animals, and are constant in many of the lowest forms of the other grand divisions.

We have hardly begun the study of the phenomena manifested by man under disease, when the controlling power of intellect is weakened, and those forces which are the ruling ones in inferior beings, and have either lain dormant, or been held in subjection, seem to come out more prominently.

We know that Nature has established an intimate relation between light and the healthy existence of the individual. Where the former is not allowed to exert its imperceptible influence on the system through its surface, there disease and structural deformities are to be met with. The health-giving and beneficent power of the sun's rays is evidenced by the ruddy faces and well-developed bodies of those who live in the country and work in the open air; and the effects of their exclusion are to be seen, not only in the faces of the miserable denizens of narrow streets and crowded alleys, but in the blanched, shrivelled countenances, stooping attitude, and more or less uncertain gait, of many of our business men, who, judging by their years, are still in the prime of life.

We think that most physiologists are prepared to admit that, under certain conditions, the general sensibility may, in a vague way, become so sensitive to light, and even sound and odors, as to attract the attention, but they are not prepared to grant more than this, namely, that it may take the place of sight and hearing, as is claimed for the somnambulist and the cataleptic. Nor are they willing to concede the possibility of light reaching the brain through the tissues and hard parts of the body independently of the eye, and producing the phenomenon which we call vision.

From an article by T. E. Clark, M.D., in Psychological Journal.

LEPROSY OF THE BIBLE, AND ITS PRESENT EXISTENCE IN NORTH AMERICA.

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First Paper.

To most of my readers the word leprosy is probably associated with some vague idea of a terrible disease spoken of in the Bible as existing among the Jews during their Egyptian life, and following them into Judea; whilst mention of it in the New Testament proves that they were still afflicted with it during the time of our Saviour. I propose, therefore, to give my readers a short sketch of the malady itself, and explain where on the earth's surface it is now prevalent, as well as where in North America it may unfortunately still be seen.

First of all I must premise by saying, that while as a dermatologist I recognize in the Bible, for instance, a perfect description of leprosy as it exists at present in many parts of the world, yet I consider that many other cutaneous affections now perfectly understood, were included in the biblical accounts, which have naturally been much confused by the various translators being unacquainted with the diseases spoken of, and unable to reproduce the sketches of them in intelligible language. This point is now too well understood and appreciated to need any discussion here. I speak of it only because it must be remembered.

The medical name for the leprosy we are discussing, is *Elephantiasis Græcorum*, to distinguish it from an entirely different affection, *Elephantiasis Arabum*, the two having been confounded by the ignorance of translators. Now, then, what is true leprosy, or *Elephantiasis Græcorum*, the Greek elephant disease? It is a disease of the blood of unknown origin, which shows itself by the collecting of an albuminious material in the skin, the mucous membranes and tissues of the body, or by invading the nerves and the nervous centres. We thus have two forms of its manifestation, which are distinguished by the terms *tubercular* and *anæsthetic*. In the first, the most characteristic symptom is the lumps and nodes in the skin, and in the latter, the paralysis, *et cetera*, due to the invasion of the nerves and nervous

centres. In both forms the affection is very chronic, lasting from nine to eighteen years, before death finally comes to relieve the sufferer from his misery. Tubercular leprosy commences by the appearance of dull red or purplish patches or lumps on the skin, and the mucous membrane of the mouth, throat, nose, and eyes. As they progress, the patches are harder in the centre, and of brownish color; the nodes or tubercles are dull red to purplish, and finally assuming a bronzed hue, till the substance deposited in them gives them a whitish color. After months, they may subside, leaving a thinner whitish cicatrix. When they break down, large cutaneous ulcers are formed, one healing whilst others form. This same morbid process goes on in the mouth, throat, and windpipe, and the deposit invades the internal organs of the body, gradually wearing out the sufferer, on an average, within nine and a half years. The discolored and wrinkled forehead, the prominent, tuberculated, bald eyebrows, the bronzed skin, congested eyes, thickened eyelids and lips, the large, red, and lengthened ears, all form a hideous picture, which makes the unfortunate leper resemble the poet's description of a satyr.

The anæsthetic form of leprosy is characterized by nervous symptoms, languor, lassitude, dullness, depression, pale and shrunken skin, anxious countenance, soft and flabby muscles; in general terms, insensibility and atrophy. We have white patches and large blister-like bubbles breaking down into cutaneous ulcers, which, healing, leave white cicatrices. Extensive surfaces of the skin become reddened with prickling pain, and the skin is left pale and insensible, like parchment. The face becomes wasted and cadaverous, the jaw drooping from muscular atrophy. The hands become thin, paralyzed, the fingers bent; the same with the feet and toes. Later, a spot appears over a joint of the hand or foot, breaking down into an open ulcer, exposing the bone, and finally the whole bone is thrown off, reducing gradually the hand or foot to mere stumps. The internal organs are affected, the eyeballs destroyed, the surface on parts of the body becomes insensible to the knife, or even live coals. The patient is worn out by the disease, sinking, at a general average, of some eighteen and a half years. These two forms of leprosy run separate courses, but are sometimes, so to speak, united; the same person exhibiting symptoms of each. Occasionally they run an acute course, destroying the patient in a few years. Its almost certain fatality, its lingering character and fitful course, its fearful disfigurement, and, we regret to add, the ignorance and superstition regarding it, render leprosy the most dreaded chronic malady that affects mankind. This rough sketch of what it does to man's body will perhaps explain to my readers why it is so dreaded, and interest them in my outline of where and when this horrible malady has scourged the human inhabitants of the world, and, I trust, also induce them to have more rational ideas in reference to the care and treatment of lepers than that which unfortunately still prevails in many civilized or semi-civilized countries.

The same leprosy yet so prevalent in many parts of the world is spoken of as afflicting the Jews during their four-century sojourn in Egypt. They carried it, of course, into Palestine. The writings of Moses, the Books of Kings, and the Chronicles, show how the people were afflicted by this disease. The New Testament speaks of its prevalence during our Saviour's time. In Greece, Aristotle perhaps meant leprosy by his *satyria*, but Areteus and Archigenes gave the first exact description. In Italy, the Romans mentioned leprosy before the time of Christ. Pliny the Elder speaks of it as coming with the army of Pompey from Asia and Egypt; Plutarch says it did not enter Rome till Asclepiad's time. During Galen's life, leprosy had spread to Germany, to Mysia and Scythia, and thus over the greater part of the then known Eastern Europe. Areteus traces it from thence to the Celts, and so over Western Europe. From the 2d to the 7th centuries it was certainly

widely extended over the whole of Europe, since all medical writers mention it as among the most common of diseases. In the 7th century it was so common among the Lombards as to cause them to be shunned by other people. Pope Sylvester I. dissuaded Pepin, King of France, from marrying a Lombard princess, because she was disposed to leprosy. In other countries, also, we have records of the spread, or, perhaps, original springing up of leprosy. In India, Persia, Turkey, Hindostan, Russia, it would seem to have moved gradually from the East to the West, and from the South to the North. It certainly has arisen and declined at different periods. Through Europe, by the time of the Crusades, it had reached its height. Mention by medical authors, and laws for the establishment and government of leper or lazar-houses, point out to us the invasion, frequency, and gradual decline of the disease in those countries where it has prevailed, and whose written history still remains. From the 15th to the 17th centuries it began to decline in Europe. That most industrious observer, the late Sir James Simpson, of Edinburgh, hunted up the notices of leprosy and leper hospitals in Great Britain. The earliest records of the disease are those of the Welsh King, Hoel Dha, in the year 950. From that date until the beginning of the 16th century, the disease was common in England. During the reign of Edward VI., 1550, it is reported by a commission for the suppressing of colleges, hospitals etc., that most of the lazar-houses in England were empty. In Scotland, the disease appeared later, 1150 being the date of the earliest lazar-houses, but leprosy was still traceable during the 17th century. In 1604, a leprous woman was ordered into the lazar-house at Aberdeen, and a notice of the same date exists of the presence of patients in the hospital at Kingscase, near Ayr. Symptoms of decline of the disorder in Scotland are perceived in an order for dismantling the lazar-house at Greenside, Edinburgh, in 1652; but in the islands to the north of Scotland, the Orkneys, Shetland, and Faroe Islands, the disease was in full activity. Towards the middle of the 18th century, namely, in 1742, leprosy was supposed to have disappeared in the Shetland Islands, and a public thanksgiving was ordered to commemorate that event; but instances still presented themselves occasionally, as is shown in the account of the parish of Northmaven, given by Mr. Jack, in 1758. In 1798, also, a patient was in the Edinburgh Infirmary; he was a native of Shetland, and a direct descendant from leprous ancestors.

Naturally enough, many other patients with loathsome diseases were sent into the leper hospitals. The records are, however, so clear of the gradual disappearance of the disease in countries where it was once prevalent, as to encourage us to hope for its final fading away from those portions of the earth now still scourged by it. But where, I hear some one asking, does leprosy exist to-day? I could almost best answer by stating where it does *not* exist. It still lingers amongst many of its old haunts on the shores of the Mediterranean, in France, Italy, Greece, and the Grecian Islands. On the Black Sea shores it even has the name of "Crimean disease." It is endemic at the mouths of the rivers of the Caspian Sea, such as the Volga. The islands of the Indian Ocean have their share still. The Atlantic islands, also, like Maderia and the West India Islands, Mexico and South America. The extreme north is still its home,—Iceland and the coast of Norway. In Norway a royal commission was appointed, a few years back, to examine into the nature of the disease, and determine the course to be taken to limit its progress, and, if possible, effect its cure. The report of this commission was printed in French, at the expense of the Norwegian government. The writers were Drs. Danielssen and Bœck. It is the first complete work on leprosy, and details the disease and its treatment in the hospitals devoted to it at Bergen, in Norway. Its great value is also enhanced by the accom-

panying portraits of the patients affected with leprosy. Since then these physicians have published still more elaborate portraits of the disease. I pause here a moment to say that leprosy, where prevalent, spares neither rank or condition. Dr. Simpson says that observations are by no means sufficient either decidedly to confirm or controvert the opinion that King Henry IV. was affected with leprosy; but they serve to show, at least, that at the time at which he lived rank of the highest kind was not considered as any barrier against an attack of the disease. In none of the alleged cases of leprosy in the royal family of England, is the proof of the actual existence of the disease at all indubitable and complete. The evidence is more certain and satisfactory in regard to the occurrence of the malady in its genuine form in other scions of the House of Anjou, than those who ascended the throne of England; for instance, Baldwin IV., King of Jerusalem, a direct descendant, like the Plantaganets of England, from Fulk, Count of Anjou and Tourraine. All historians seem to agree in stating Baldwin IV. to have labored for some years under leprosy, and to have ultimately resigned his sceptre in consequence of disability from that disease. Fuller, in 1174, says of him, "He was inclined to the leprosie called elephantiasis." By 1183 "the leprosie had arrested him prisoner and kept him at home;" "at last he was made to stoop, and retired himself to private life."

The disease also did not spare the royal family of Scotland. At least two cases of leprosy are alleged to have occurred among the members of it. King Robert the Bruce died of it.

In 1867 the British Government published a "Report on Leprosy, by the Royal College of Physicians, to her Majesty's Secretary of State for the Colonies." The portion of the report relating to India contains over a hundred replies from medical officers located between Peshawur and Calcutta, and the Himalayas and Central India, together with Burmah and the Straits. From a perusal of this report we learn that there are parts of British India where *one out of every sixteen people* is affected with leprosy. Whether it is on the increase, is difficult to say. The natives are reported as shunning even the mention of the disease, and will invariably, if possible, mislead as to the facts of the case. Leprosy is shown to be very common among the natives throughout the whole Presidency and the Straits. It is common in the three stations of Penang, Malacca, and Singapore. It would seem as if India was the present home of leprosy, although few portions of the globe are quite free from it. Its prevalence in parts of what we call China is well shown by the local hospitals for its cure and treatment. This report I have just spoken of, and the various letters of medical men from different parts of the world, in reply to a general request for personal information from Prof. Virchow, of Berlin, have given a much more correct and extended knowledge of this fearful malady, but one which the student of dermatology had already acquired through Drs. Danielssen & Bœck's special treatise, published in 1848.

THE RELATIVE VALUE OF FISH AND BUTCHERS' MEAT. — The elementary composition of the flesh of mammifers differs little from that of fish, especially when dried; the blood of fish is less rich in globules; the amount of earthy salts is less in proportion to the organic matter in osseous fish than in reptiles, birds or mammifers; the skeleton of cartilaginous fish consists of a peculiar firm animal matter without calcareous deposit; the milt contains a fatty substance closely resembling that of the yolk of a fowl's egg; between the roe of fish and the eggs of birds the analogy is perfect; the fatty matter extracted from fish differs greatly in consistence, according to the varieties from which it is obtained. Finally, chemical analysis shows that fish contains all the constituent elements of a perfectly composed food. As regards nutritive power, the flesh of fish holds the second rank; it is as wholesome as the flesh of mammiferous animals or of birds.

MORE ABOUT TEA.

THE plant from which a large source of wealth is obtained is a shrub, the native country of which is still not definitely known. Although it has been cultivated for many hundreds of years in China, and its use alluded to in ancient Chinese legends, it has not been discovered in that country in a wild state, but truly native tea occurs in the jungles of North-eastern India.

Tea (*Thea chinensis*, L.).

At one time botanists were inclined to the opinion that black and green teas were furnished by two distinct species, the former by *Thea bohea* and the latter by *T. viridis*. So little difference exists between them that there seems no doubt as to their being mere varieties, and both are now usually referred to one species, the *Thea chinensis* of Linnæus. Though tea is now largely grown in Assam, and some also in Japan, the plants cultivated in both countries are varieties introduced from China. The black and green teas of commerce may be prepared from either form of the plant, according to the pleasure of the tea farmer, the color in a great measure depending upon the rapidity of the artificial drying of the leaf, and also upon the length of time the freshly gathered leaves are exposed to the air before heating. There are, however, districts in China called respectively the Black and Green tea districts, in which the plants are grown specially for each purpose. For the preparation of either sort the leaves are gathered by hand, and the younger ones should alone be taken. If they are intended for the manufacture of black tea they are exposed to the air for a short time, after which they are placed in iron pans and submitted to a gentle heat for a few minutes. By this process much moisture is thrown off, and the leaves are rendered pliable, so that they are easily pressed or rolled between the hands, by which the characteristic twist or curl is given to them. Before, however, they are fit for market, they are exposed to the air for two or three days, and finally dried in iron pans over a slow fire .The chief difference in the preparation of genuine green tea is, that it has to be more quickly dried after undergoing the curling or twisting process in the hands, black tea being allowed to remain in heaps in a flaccid state, before the final drying or roasting, which, in itself, is much slower.

The processes peculiar to the preparation of black tea are styled Leang-Ching, To-Ching, and Oc-Ching; and these all consist in carefully watched and regulated processes of heating the leaves, until a certain degree of fragrance is developed. The leaves are said to wither and give, and become soft and flaccid. The utmost care, practical skill, and experience are required in rightly conducting these operations; and as soon as the proper point is arrived at, the leaves are to be immediately removed to the roasting-pan.

After being roasted and rolled two or three times they are then to be dried, and this is effected in a cylinder of basket-work, open at both ends, and covered on the outside with paper; it is about two and a half feet in height, and one and a half in diameter, which diameter is diminished in the centre, as in a dice-box, to one foot and a

quarter. This stands over and round a small charcoal fire, and is supplied with cross-bars about fourteen inches above the fire, on which an open sieve, containing the tea, is placed. A small aperture, about an inch and a half in diameter, is made in the centre of the tea with the hand, so that an ascending current of air and the products of combustion pass through and over the tea contained in the sieve. A circular flat bamboo tray is placed partially over the mouth of this basket-work cylinder, and most probably serves to regulate the rapidity of the ascending current, and prevent the admission of the cold air to the leaves, and at the same time allow a sufficient outlet for the generated watery vapors and the products of combustion.

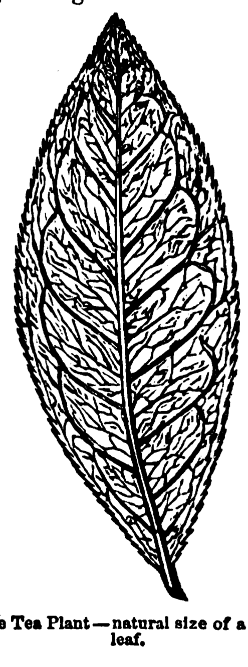
At the commencement of this operation the moist leaves are still green, and retain their vegetable appearance. After the drying has continued about half an hour the leaves are turned, and again submitted to the heat for another half hour; they are then taken out, rubbed and twisted, and after sifting away the small dust, again returned to the sieve and drying tube. This operation of sifting is very necessary, to remove any of the small tea or dust which might otherwise fall through the meshes of the sieve on to the fire, as the products of their combustion would deteriorate and spoil the flavor of the tea.

The leaves have now begun to assume their black color; the fire is diminished or deadened by ashes, and the operation of rolling, twisting, and sifting is repeated once or twice, until they have become quite black in color, well twisted, and perfectly dry and crisp. They are then picked, winnowed, and placed in large quantities over a very slow fire for about two hours.

In the operations for the manufacture of green tea, on the contrary, the freshly picked leaves are roasted at once, without delay, at a high temperature; rolled and roasted again and again, assisted sometimes with a fanning operation, to drive off the moisture; and always with brisk agitation, until the drying is completed.

A great deal, however, of the green tea consumed in this country, is artificially colored by the Chinese, chiefly with Prussian blue, gypsum, and turmeric. Of course it is only inferior teas that are so treated, a good face being thus given to them. They can mostly be detected by placing a handful of the tea on a sheet of white paper; a thick, greenish dust will not only be left on the paper, but will rise every time the tea is shaken. By breaking a few leaves, also, with the finger nails, this colored tea will show a brownish fracture, while genuine uncolored tea is more or less green throughout, and consequently little or no dust is deposited from it. As the leaves of true tea vary very much in size and form, adulteration with the leaves of some other plants is not so easily detected. The nearest approach, however, to the form of the true tea leaves are those of *Camellia sasangua.* This plant itself is a near botanical ally to the tea, and the leaves are moreover used by the Chinese for scenting many of their teas. Most other leaves which have been found as adulterants may be detected by their forms.

We give a figure of a leaf of true tea.



Leaf of the Tea Plant—natural size of a full-grown leaf.

If a leaf of black tea be soaked in cold water, spread out, and inspected through a microscope of ordinary power, it will present the appearance shown in the cut; the older and larger leaves will be of a dullish green, and the younger ones of a light semi-transparent green. It will not serve us to examine the internal structure of the leaf, as it has many points in common with other leaves, and would moreover require minute examination. The best black tea, then, should present the appearances above indicated, and the same may be said of green tea, with this exception, that after being soaked it is of a paler green color than the former.

Amongst the commercial varieties of tea the following are the best known: — Congou; this constitutes the bulk of black tea from China. It is that which is usually sold as black tea, and of course varies much in price according to its purity.

Souchong and Pekoe are both finer kinds of black, and fetch higher prices. Another kind of black called Orange Pekoe may be known by its long, wiry leaves, which are mostly genuine; it is artificially scented, and is generally used by grocers for mixing with inferior kinds.

Caper is a common black tea, artificially scented; the leaf as we see it in commerce has the form of the Gunpowder leaf, but these are made up of tea-dust and other matters agglutinated.

Amongst green teas, genuine Gunpowder is the finest; the qualities and prices, however, vary very much; the leaves of the best are in fine, close curls, and are the younger ones gathered from the tops of the plants. The lower qualities of this tea are almost all colored artificially, and many contain no perfect or whole leaf at all, but are made up of broken tea-leaves. In Hyson the leaf is longer than Gunpowder; it is mostly composed of the true leaf, but is very frequently artificially colored.

Oolong is really a green tea, but with so black an appearance that its color is only developed by putting it in hot water. It is artificially scented, and is used for mixing with other kinds of tea.

Though teas of varied qualities are imported from China, those of the very finest kinds seldom leave the country, except a small quantity which is carried overland to Russia, where they sell for as much as twelve dollars per lb., and the same price is even paid by the princes and mandarins of China in the very country where the tea is produced. It is said that these fine teas would deteriorate in quality in such a journey as that from China to England or America. A fine variety of Assam tea, called Flowery Pekoe, is now chiefly imported for the Russian trade, very little of it being sold in this country. Though the Russians boast, and with good reason, of the quality of their tea, a vast quantity of rubbish is sent to that country from China for consumption by the poorer classes.

Tea leaves contain an active principle called "theine," and a volatile oil; they also contain about fifteen per cent. of gluten or nutritive matter, very little of which, however, is extracted by the ordinary methods of tea-making, and about twenty-five per cent. of tannin, or astringent matter. The effect of theine upon the human system is to excite the brain to greater activity, but whether or not it soothes the vascular system by preventing the rapid waste of the body, is a point upon which physiologists are not quite agreed. Prof. Liebig asserts that theine contributes to the formation of bile; and, indeed, shows that its chemical equivalents are similar to those of taurine, the nitrogenized compound peculiar to bile. If, therefore, this product can be obtained from tea, instead of from the change of matter in the tissues, it must necessarily cause a great economy of the human frame. Theine, however, if taken in excessive quantities, produces tremblings, irritability, and wandering thoughts; it has been recommended that when these symptoms show themselves, cocoa should be used as a beverage for a few days. The volatile oil is narcotic, and exhilarating; it is to this oil that the flavor and odor of tea are due. It is of course

present in larger quantities in new teas than in old, therefore the fresher the teas are the fuller is their flavor and odor, consequently no kind of tea improves by being kept exposed to the air or even in paper, so that tea weighed at the time of purchase should be preferred to that sold in packets, the buyers of such tea having to risk the length of time it has been packed; and, moreover, the teas themselves are usually of an inferior description.

WOMEN'S DRESS.

BY ROBERT WHITE, JR., M.D., BOSTON.

First Paper.

THOU art wonderfully and fearfully made-up, O Woman! — truly Solomon, in all his glory, was not arrayed like one of *thee;* these passages of Scripture a little perverted, are in a measure descriptive of the dress of our modern women. By dress we mean everything in the shape of clothing that covers the person, whether worn with a view to comfort, beauty, or deception; that's a hard word, but it best expresses the use of a great many things worn by ladies at the present time. Now I am not going to follow in the beaten path of writing a tirade against women's extravagance, vanity, and all that sort of thing, nor to define the style or color of dress, or to notice it in its æsthetic relations at all, farther than the health and comfort of the wearer is concerned, knowing well that the labor would be lost, as woman will always regulate such matters to suit herself. What I propose to do, is to point out some failings in the present style of dress that women seem to be ignorant of, and to show them how the clothing should be arranged on the person so as to be best adapted to the purposes for which dress is designed, without inconvenience or harm to the wearer; for that the manner in which some portion of the female dress is worn at the present time is productive of injury cannot be denied.

The Ancient Style of Dress.

We all know that the first style of dress adopted by our first parents was the fig-leaf, and, primitive though it was, it was all-sufficient for the climate and state of nature by which Adam and Eve were surrounded. Then, as now, the fashions changed often (so the women must have dictated the styles even in that day), and soon a more perfect covering — mainly of the skins of wild beasts thrown loosely about the form —was substituted for the fig-leaf. This, in time, was replaced by garments of coarse linen of the imperfect domestic manufacture of the day. The form and appearance of these garments changed in about the same way they do now, the difference being mainly in the minor details of ornament and arrangement. One style of dress that was worn by women for a long time, without essential change, was a long gown falling from the shoulders, and fitted to the form at the neck only. Generally, but a single garment was worn. At other periods, a dress was used that fitted the form loosely, being composed of two pieces, secured by a brooch or ornament over each shoulder, leaving the sides open, and allowing great freedom for the motion of the limbs. With such a dress, stomachers, consisting of a colored or embroidered handkerchief or shawl folded loosely about the waist, were often used to confine the garment to the body. Sometimes these shawls and embroidered cloths were worn so large as to form a sort of petticoat. As a general rule, the stomachers and girdle about the waist were for ornament only, and were rarely used to support the clothing. Usually, the arms were left quite bare and free, or, when sleeves were worn, they rarely extended to the elbow. Whenever a petticoat or skirt was worn that had no attachment to the shoulders, it was suspended from the waist,— not by a

tight band an inch wide, as is now used,—but by a full, ample, folded girdle, widely diffusing the pressure, and not pressing on or binding down the waist to any appreciable degree. In some nations — the Greek, mainly — a light jacket was worn, not fitting tightly, but hanging loosely over an under garment, and full, flowing trousers, supported at the waist by the easy fitting girdle; so that when the Greek and Roman women of old times wore their clothing suspended from the waist, it was effected in such a manner as not to occasion the least inconvenience. This principle of freedom and ease in dress was maintained and recognized as the best for some thousands of years; the principal changes during this time were in its arrangement and trimming, and in the materials and ornaments used; the form of wearing it remained essentially the same. On the old Assyrian and Egyptian sculptures we see this style of dress for women portrayed down to the period when the history of these nations ceases. The Jewish archives prove that it was worn by their women during the many centuries of their varied existence as a nation, and we know from the history of Greece, Rome, and other nations, that it was only in comparatively modern times that a style of dress approaching the present fashion in its close-fitting, restrictive arrangement was adopted. Just when the tight bodice, the multiplicity of skirts, and the tight bands about the waist came into vogue, cannot be positively stated; probably the change was a gradual one; and as for the abominations of corsets, panniers, and bustles, it is no wonder that their origin is lost in obscurity, as any age ought to be ashamed to own their introduction, since their use so often degenerates into positive abuse.

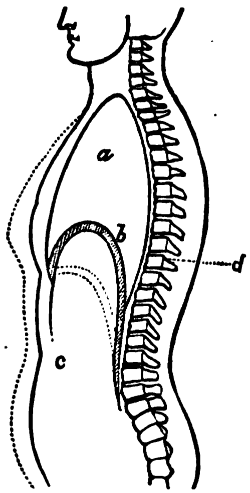
What Women must wear.

Now don't think that I am about to recommend that women should wholly abandon the present style of dress, and return to either the primitive fig-leaf, or the ancient *peplum* or *tunica*, and, worse still, that she should adopt a bloomer costume. Those who fear that women, as a class, will ever adopt an attire similar to that worn by men, may rest assured that such will never be the case while she retains her present regard for appearance, above all other things, for this reason: owing to certain functional peculiarities of the sex, the hips in women are much broader than in men, therefore the bones of the lower limbs are more widely separated than in the other sex; the consequence is, that most women walk with an unsteady, vacillating movement, — waddle is the best term to express it,— very different from the bold, firm, confident step of men. By the use of the full, flowing skirt, the details of a woman's step are not observable, consequently the awkward movement is changed into a graceful, gliding, undulating motion. Women, knowing this, will be likely to retain the style of dress that best conceals this peculiarity of gait, and will not readily adopt the pantaloon, the very style of all others that would expose it, appearances being prominent above all other considerations with them. The full skirt, then, being the style of dress likely to be worn by our women for this generation at least, the question arises, How shall it be suspended?

Respiratory Movement of the Chest and Abdomen.

To properly understand how the body is affected by the disposition of the clothing, it is necessary for the reader to know how the function of respiration is performed by the walls of the chest and abdomen, and for this purpose the accompanying plate has been introduced. The black line shows the outline of the chest and abdomen just after an expiration, when the lungs are empty of air, and the chest collapsed; the dotted line indicates the change of form when the chest is expanded after an inspiration. Inspiration is accomplished not only by the direct expansion of the lung itself, but by the expansion of the chest walls as well, aided by the descent of the diaphragm into the abdominal cavity, forcing the organs in this locality

downwards, to make room for the expansion of the lower part of the lungs.



Black line shows outline of chest and abdomen, when chest is collapsed after an expiration. Dotted line shows some outline, when the chest is expanded by an inspiration. *a*, the lungs. *b*, the diaphragm or muscle between chest and abdomen; this descends to the dotted line in inspiration, and vice versa. *c*, abdominal cavity. *d*, vertebræ or backbone.

Expiration is produced by the elasticity of the lung tissue forcing the air out, the collapse of the chest-walls, and the contraction of the abdominal muscles, so that the organs being pushed upwards force the diaphragm against the lungs, and assist in expelling the air from them. That the abdominal muscles play any important part in the specific act of *inspiration* cannot be stated positively, but that their action is necessary for the proper performance of *respiration as a whole* is undoubted, as any one may readily convince themselves by placing the hand on the abdominal muscles, and noting their active motion during respiration. Of course, if the chest or abdomen is tied down by tight corsets, by waistbands, or by ligatures of any kind, the walls cannot expand, and respiration cannot be properly performed. A healthy person whose chest is not confined in any way should breathe about twenty times a minute; but I notice that most ladies who dress in the fashionable style of to-day, instead of taking this number of full, natural inspirations, are compelled to breathe much faster, shorter, and with much less ease than is natural, owing to the confined state of their waists and chests. By degrees they get accustomed to this style of breathing, so that they fail to notice its peculiarity, but this does not lessen the bad effects of it. The lungs *must* have a certain amount of air to maintain health, and if they cannot get it by the usual full deep inspiration, the short, quick, unnatural style of breathing is substituted.

The Weight Suspended from a Woman's Waist.

"Oh, I don't wear corsets to make my waist small, but to support my clothing!" nearly every woman will say, when the charge is brought home to her; but, spite of all their protestations, an examination reveals the fact that in the great majority of cases the corsets are so tight that the hand cannot be slipped between them and the body; if nothing but *that* will support women's clothing, as worn at present, the sooner we return to primity the better it will be for all concerned. Then, added to the corsets, are half a dozen tight ligatures about the waist, in the shape of the waistbands of the dress, skirts, and underclothing. The pannier, bustle, and perhaps half a dozen other things, also find their point of support at the waist. The average weight, all the year round, of that portion of a woman's clothing which is supported from the waist, is between ten and fifteen pounds. "That's a story!" I hear you all exclaim; but wait: weigh the clothing for yourself before you pass judgment, and see if I am not right. Remember — *everything that is suspended from the waist* — including hoopskirt, and skirt of dress; for the waist of the latter is made so tight, that the skirt gets no support from the shoulders. Think what a weight that is to have suspended from the waist! If a woman was sentenced to carry such a weight about in this way for a number of years, for some great crime, the punishment would be denounced as an inhuman one; yet there are thousands of women in our streets daily

enduring such a punishment voluntarily, because it is the custom, and because they do not know the bad effects likely to follow it. I have often heard ladies expressing pity for military men in their tight coats and belts, but let me tell them that a close-fitting uniform, with all its belts and trappings, can be worn with far more comfort and less injury than a tight corset, or waistbands, as they are usually worn. In our army, during the late war, soldiers were never injured by weight suspended from the shoulders; but if heavy equipments were attached to the waist-belts, as was the custom at the commencement of the war, they invariably caused great mischief. Later, the knapsack, the heavy cartridge-box, the haversack, and the canteen, were all suspended from the shoulders, as it was found impossible for the soldier to carry any of them at the waist without injury. The officer's sword, even, though attached to the waist-belt, was suspended mainly from the shoulder by a light cross-belt. Any one who has ever worn equipments will recognize the great relief gained by taking the weight off the waist; yet we often find delicate women supporting a greater weight in this way, than it was found politic to impose on able-bodied men.

Waist or Shoulders?

This is the point that I wish to impress on my lady readers: that their clothing should be suspended from the shoulders rather than from the waist or hips, because the shoulders, from their form and position, are better adapted as points of support, those portions of the shoulders on which braces or suspenders rest being formed mainly of bony parts, which have hardly any other office to perform than to furnish points of attachment for the muscles, and for support for the arms, and it is unnecessary for the braces to press heavily on any part of the chest that is actively employed in respiration. That is why the shoulders *should* be used for the support of the clothing; and now we will show why the waist *should not* be used. On the freedom of the female from all undue abdominal pressure, as well in the single as in the married state, depends not only the health, but the very existence of their offspring,— our entire race. The organs affected by such pressure are complicated and delicate in their structure, and if confined or pressed upon in any way, become subject to those innumerable "diseases of women" which were but little known among the sex until the introduction of the tight corset and waistbands, and the dragging skirt, and which increase in frequency as fashion increases the innovations and styles of dress designed merely to please the eye (but generally failing in this even) without the least regard to the comfort or health of the wearer. Men, who would not be liable to suffer one-half the injury that women are liable to, rarely wear their clothing suspended in this way, the light weight of the trousers even being supported from the shoulders by braces. That the abdomen is not as well fitted as the shoulders for the support of the clothing, should be evident to any one from their different form and construction, the latter being bony and resisting in character, while the parts about the waist are soft and yielding; the superior shape and position of the shoulders is a great point in their favor. Women forget — indeed many are never aware of it — that the abdominal muscles have important offices to perform in addition to the part they play in respiration. This is another indication of the great want of education in the physical constitution of our bodies, which is so apparent in even those classes of society where no pains or expense are spared to make the pupil's education perfect; yet the "one thing needful" is neglected. This applies to both sexes; and until the rising generation is taught something of the construction and organization of their bodies, we cannot expect to have a healthy race of men and women. If a band be tied tightly around a muscle in any part of the body so as to prevent its natural contraction, the substance of the muscle will gradually waste away, become smaller in size, and, in time, lose all its power.

This is just the way that the muscles of the chest and abdomen are affected by tight-lacing. Every physician is familiar with the thin, attenuated appearance of these muscles in women who have been in the habit of wearing tight corsets and bands. I have seen these muscles so wasted from this cause, that hardly one-fourth of their original bulk remained, so you see how imperfectly respiration was performed in these cases; but this is not all the mischief done by the paralyzing of these muscles; in women, the abdominal muscles have to perform the very important office of assisting in childbirth by their forcible contraction, and it is well known by physicians that women in civilized countries suffer much more protracted confinements than those in a savage state; also, that in the same communities, the higher the station in society, or, in short, the more the women of a class are governed by the dictates of fashion, now in force, the greater is the suffering experienced in the hour of their greatest trial. Women in the lower orders of society, despite their vicissitudes of hard labor, exposure, want, and suffering, as a general thing suffer less in this way than their more favored sisters of the upper orders, for the reason, I think, that the poor cannot afford the luxury (?) of tight corsets, and their active duties preclude them from wearing their skirts and dresses as tight as the fair ladies whose hands are never soiled by labor, and whose shoulders never bore a burden; so the muscles are not bound down and paralyzed, but are developed to their full vigor, and enabled to perform fully the duties for which they were supplied. The proper movement of the bowels depends greatly on the proper contraction of the abdominal muscles; if this power is deficient,— as it will be when the muscles have been paralyzed or weakened by tight corsets or dragging skirts,— this function will not be properly discharged, and great misery is apt to ensue; yet one of the most active exciting causes is often overlooked. These tight corsets and skirtbands are productive of a great deal more misery than any one is aware of. This question of the relative merits of the shoulders and waist as points of support for the clothing, has long been discussed, and many arguments have been advanced in support of both modes, but the preponderance of testimony is decidedly in favor of the shoulders. It is said that straps over the chest will impede respiration; and so they will, if improperly worn, but a little judgment will easily remedy this defect. It is also said they will restrict muscular motion and freedom of exercise of the arms; but this will not be effected one-half as readily by braces over the shoulders as by the tight-fitting waists of dresses that are worn now. No woman can make her hands meet quickly over her head with the arms extended at full length, with any comfort, while tied up in one of the fashionable costumes of to-day; and the objection that braces prevent respiration is not valid, for they can be so arranged that they need not interfere with the movement of the chest in any way.

Knowledge of One's Self. — It is perfectly outrageous that men and women should be so profoundly ignorant, as they are, of the nature of that prison-house from which they can never escape so long as life lasts, that our youth should, under the pretence of training, be taught things which they can never see or touch in after life, should be made wise in phantoms and myths, and encouraged to put aside all curiosity about the things which they carry about with them always everywhere. Is it not monstrous that many a lad of eighteen should have so vivid a picture in his mind's eye, of, say, Syracuse during the Peleponnesian war, as to make people think he must have lived long years in Sicily, while the inside of his own body is to him a dim mystery, of which he can call up no clear image, but fancies it is somehow or other more or less like a pig's?

Other animals than man generally live their full and allotted periods, unless destroyed by violence. Plants have a better promise of complete life.

THE KITCHEN RANGE.

AMONGST all the fittings of a domestic residence, it may fairly be asserted that none are so important to the comfort of the inmates, or at times more conducive to their discomfort, than the means and appliances employed for warming the building. What more delightful than the winter fireside of a country house? or more miserable than a smoky chimney? The whole subject of fireplaces, chimneys, and fuel, is indeed, so far as the householder is concerned, all one, though it requires to be considered under several heads; we shall also show, in due course, that economy and the healthiness of a household are intimately connected with the same question. As, however, it would be impossible to treat on the several heads enumerated above in one article, we propose, first of all, after a few introductory remarks on chimneys, to devote our attention to the Kitchen Range, as being unquestionably the most important fireplace in any house.

It is, we believe, nowhere recorded when and where chimneys were first invented. They were evidently common in Venice before the middle of the fourteenth century, for an inscription over the gate of the school of Santa Maria della Carita states that in 1347 a great many chimneys were thrown down by an earthquake, a fact confirmed by John Villani, who refers the event to the evening of the 25th of January. In the year 1368, also, Galeazo Gataro relates that Francisco da Carraro, lord of Padua, came to Rome, and finding no chimneys in the inn where he lodged, because at that time fire was kindled in a hole in the middle of the floor, he caused two chimneys, like those that had been long used in Padua, to be constructed by the workpeople he had brought with him. From the foregoing facts we may, perhaps, with some degree of correctness, fix the fourteenth century as the date of the first introduction of chimneys.

Now the use of chimneys being, primarily, to carry away the products of combustion, and, secondarily, for purposes of ventilation, the subject must be considered in both those lights. With the huge wood fires of our ancestors, the large hearth recess and the capacious flue did not interfere with the accomplishment of the object proposed; but when fireplaces were introduced into small rooms, and coal was substituted for wood, the arrangements which were suited to the large hall or kitchen did not apply. Five hundred years of experience in chimney construction does not appear to have resulted in the deduction of scientific rules for their apportionment, so far as houses are concerned. In this respect Architects have unquestionably been left far behind by Engineers, who, when they desire to erect a chimney shaft for a factory or steam engine, carefully apportion the dimensions of the structure for the work which it has to perform; it is, however, too often the case that flues in houses are constructed of the same sectional area, whether they be twenty or fifty feet in height; whereas dimensions that may be suited for the one height are perfectly inappropriate for the other. One consequence of this is the disfigurement of buildings by the addition of chimney-pots, for the purpose of contracting the orifice of a flue which has been constructed too large for the duty that it has to perform. Defects arising from this cause are too often attributed to the position of doors or windows; whereas the real reason of their existence is assignable solely to the entire absence of any calculation for determining their proper proportions. Something, it is true, may be said with regard to the setting of fireplaces, as well as to their construction; but we do not purpose to enter into this question in the present article.

Perhaps one of the greatest treats that a cook could enjoy is to be served with a dinner cooked by some one else. The reason of this is that the constant smell of cooking nauseates the stomach, making it, by the sympathetic action of the several nerves of the system, disinclined to receive what it has

so long anticipated through the action of the senses. Similarly, also, the mistress of a household enjoys nothing better than to get some one else to superintend the ordering of her several meals. But if this is caused, to a certain extent, by a mere knowledge of what is coming, how much more must it be the case when the smell of cooking — as too often occurs — pervades the house as well as the kitchen; and in some instances the smell of dinner will be perceivable in other parts of the house to a greater extent than in the kitchen. To a delicate person this is sufficient to entirely destroy the appetite, and it is due solely to defective construction. The cook is too often blamed when the architect is in error; and, while few know where to assign the fault, fewer still know how to remedy it; but it may be taken for granted that the evil will not disappear from amongst us, until the art of house construction is based upon a more scientific principle than it has hitherto attained. Art and decoration, and the convenient arrangement of accommoda.ion, occupy, in the present day, far too much of the consideration of the architect; whilst sanitary arrangements are neglected, and the healthfulness of buildings suffers in consequence.

In order to arrive at a true appreciation of the causes that lead to the kitchen being a nuisance in a house, instead of, as it should be, the means of imparting pleasure and comfort, we must consider, first, what is a smell and how it is conveyed. A smell, then — and here we are referring, it will be understood, to a smell that ought not to exist — is matter in a wrong place, and, consequently, it is *dirt;* and not only is the smell of cooking, when it pervades a house, dirt in a scientific sense, but it is so absolutely. The smells arising from cooking consist of minute particles given out from food of all kinds, owing to the partial chemical decomposition which takes place during the application of heat, and which are carried off and mixed with the surrounding air by the steam or other vapors arising therefrom. With a properly constructed kitchen range or cooking stove, and flue, these will all be conveyed up the chimney, and carried away into the atmosphere above the house. In such case they are harmless, and become immediately, so to say, deodorized, by admixture with a preponderating amount of atmospheric air. When, however, they are permitted to escape into the house, they do not meet with a sufficient quantity of air to render them innocuous; and, upon condensation of the vapors by which they are conveyed, they will settle upon the interior walls and gradually cover them with a coating of grease and vegetable matter. These, if not constantly removed, will accumulate, and in time decompose, giving off still more objectionable and unhealthy smells, but which are not so noticeable, in consequence of the more powerful odors arising from a continuance of that evil from which they first had their origin.

It will repeatedly be found that the smell of cooking is strong in other parts of the house, and especially upon the floor immediately above the kitchen, whilst the kitchen itself is apparently free — or almost so — from the inconvenience; and the reason of this is, upon a little consideration, made perfectly clear and intelligible.

The cause of this annoyance is an absence of any proper regulation of the currents of air through the kitchen, or, in other words, defective ventilation.

The chimney being, as we have already stated, to some extent intended as a means of ventilation, if it do not carry off all the fumes arising from the combustion of fuel; as well as, in the case of a kitchen range, all the vapors consequent upon cooking, there must be something wrong in its arrangement or form. Let us for a moment trace the air currents of a room. By an old experiment of applying a lighted paper to the edge of a room door when it is closed, or partially so, it will be found, by the direction given to the flame, that there is constantly an inward current of air at the lower part of the door, and an outward current at the top.

This arises from the fact that, heated air being lighter than cold air, it rises to the top of the room, and, escaping

through the cavity between the upper part of the door and the door frame, its place is supplied by a current of cooler air, which, being heavier, enters from below. This lower current will be found to be much more powerful when there is a fire in the room, as then, besides supplying the air necessary to replace the escaping heated atmosphere, a considerable additional quantity is required to support the combustion of fuel in the grate, and the air thus supplied escapes up the chimney; whereas, when there is no fire there is a downward current in the chimney itself, which assists in supplying fresh air to the room. Bearing this principle of ventilation in mind, let us now trace the course of those vapors, or smells, which at times escape from the kitchen into the other apartments whilst cooking is going on. In the first place, were the ventilation of the kitchen perfect, all these fumes would escape up the chimney; but, in the absence of proper arrangements for this purpose, a portion of them escape into the kitchen, in the first place, and, rising with the heated vapors of the apartment, ascend until they fill the entire space between the ceiling and the top of the doors; and it will be found by practical test that whilst the lower part of the room is almost free from smell, the upper stratum of air is strongly impregnated with the odors arising from cooking. If the top of the door leading into the outer air be above that of the inner door, a certain portion of these will escape into the atmosphere; but, as both doors are usually of the same height, they will by preference escape over the inner door, and so get into the other part of the house. This arises from the fact that the house itself acts as a huge chimney to the lower apartments, and the outer current of air is consequently stronger in the direction of the house than towards the atmosphere. The fumes, therefore, which are unable to ascend the chimney will escape into the house, and be carried by the ascending atmosphere into the passages and rooms on the lower floors above. It may, however, not unreasonably be asked why, under these conditions, the smell is not strongest in the top story, rather than on the floor immediately above the kitchen? A moment's reflection will explain this. If the heated air thus impregnated retained its initial temperature, we should undoubtedly find it most conspicuous on the topmost floor; but meeting, as it rises, with cooler currents, it not only becomes condensed, and so freed to a certain extent from its impurities, but by the admixture of a larger quantity of air the impurities become diluted; and, ultimately, as the air rises, all sense of their existence becomes lost.

There can be no doubt that the inconvenience to which we are referring exists to a much greater extent where the closed top ranges are employed than with an open range, in consequence of the draughts of combustion being conveyed up close flues; whilst a small register only furnishes the means of escape for the other vapors, and through which the draught is not sufficiently strong to carry them off. For this reason close-topped ranges are more likely to be offensive than those with open fires; but for convenience of cooking, the former are certainly more advantageous, in consequence of the whole top of the range being a hot-plate. A combination of the close and open range, whilst they possess, to some extent, the convenience of the hot-plate, do not obstruct the proper current of draught up the chimney, and are, therefore, not to the same extent liable to the defects of which we have been speaking.

In making these remarks we desire especially to avoid giving any opinion decidedly adverse to close ranges. We have known them to act admirably, and to be free from the causes of complaint to which we are referring. From what we have already said, it will be understood that the smell of cooking in a house arises, not generally in consequence of a defective stove, but from a faulty chimney, or the bad setting of a stove.

It would be impossible to lay down any golden rule for the avoidance of the inconvenience, as each case must

depend upon local circumstances. Every builder or professed chimney doctor will have his own remedy, consisting, probably, of some patent in which he is personally interested; but whilst all may be good under certain circumstances, each one will probably be found to fail in nine cases out of ten. The only scientific way of getting over the difficulty is either to increase the draught of the chimney through the orifice up which the fumes of cooking should ascend; or else to draw those fumes off from the upper stratum of air in the kitchen, as near the ceiling as may be convenient, either by means of a ventilator in the chimney, or by one communicating with the outer air from some part in the wall, as high as possible above the top of the kitchen door.

A simple yet effectual way of accomplishing the former object is by contracting the orifice of the register where necessary, and decreasing the open space round the front of the range, thus inducing a stronger current from the kitchen up the flue. This is quite practicable with a kitchen range, although it could not be applied as a remedy for any evils attendant on the fireplace of a sitting or sleeping apartment, because one of the consequences would necessarily be the shutting out of a portion of the heat of the fire from the room. This in the case of a kitchen would be no immediate drawback, as the fire would still be equally available for culinary purposes; but, under circumstances where the fire is merely required to heat an apartment, any contraction of the chimney-piece front would tend immediately to detract from the very benefits the fire was designed to contribute.

HOW TO BRING UP BABIES.

Part II.—Teething.

During the second phase of babyhood important changes take place in the whole digestive economy, and the infant's comfort and welfare are threatened by those numerous and ill-defined ailments which are incident to the period of teething.

The appearance of the teeth is a sign of preparation for the reception of more substantial food than the infant has hitherto been supplied with; but the cutting of the teeth through the gums by no means constitutes the whole process of "teething." We are apt, indeed, to attach too much importance to this one portion of the process, by which our attention is not unnaturally arrested, as it is the only part that is visible to us, and we are liable to overlook those other contemporary changes in distant parts of the body, which may be the real source of much of the uneasiness which we unwarily attribute to the irritation of the gums alone. At this period of the infant's life all the digestive organs undergo a rapid development, awakening from comparative torpor to that state of activity which is necessary for the conversion of inanimate vegetable and animal foods into living muscle, nerve, and bone; and the presence of teeth is a mere mechanical item, it is true a very important one, in the long catalogue of agents that come more prominently into action in the digestion of solid food.

Thus what we might, at first sight, regard as a troublesome and defective method by which nature provides us with the means of biting our food, we observe on more attentive examination to be an admirable means of insuring a gradual transition from liquid food, through soft solids, to those tougher luxuries we might otherwise be tempted to attack before our digestive organs were ready to receive them; and the gradual change in the diet which is thus clearly enforced can never be ignored without giving rise to much discomfort and suffering.

The irruption of the teeth in infants begins at some period between the sev-

enth and ninth months, and is usually completed by the end of the second year. During this time all the milk teeth, twenty in number, are evolved; but they do not succeed one another at regular intervals of time, though they, as a rule, appear in definite order.

The two front teeth of the lower jaw appear first, usually towards the end of the seventh month, and are followed, after an interval of from four to six weeks, or even two months, by the corresponding upper teeth; then another tooth is added on each side of those in the lower, followed by a similar addition to those in the upper jaw. The eye teeth do not come next, but after three or four months time a double tooth appears, usually in the lower jaw, and a second one on the opposite side; and these are soon followed by corresponding upper teeth. After another interval — perhaps of three or four months—the two eye teeth appear above and below, and the remaining four hindermost double teeth show themselves after an interval of several more months, so that the child has all its first set of teeth completed by about the second year.

The times and order of appearance of the teeth are subject to certain variations even in perfect health, and the most healthy children do not always cut their teeth the earliest. In very weakly and diseased children the appearance of the first teeth may be postponed until after the twelfth, fifteenth, or even eighteenth month.

Each little tooth is contained in a separate cell or *sac*, of which the inner lining consists of a loosely formed membrane; when the time advances for the liberation of the tooth, this membrane contracts, the opening at the mouth of the cell is enlarged, and the tooth emerges from imprisonment. This theory is pronounced in accordance with sound principles of physiology, and is at the same time the most rational. According to this theory there are two distinct stages of dentition: the first by which the tooth emerges from its cell-like confinement, and the second which marks the piercing of the outer coating of the gum. Those who have had experience of infant management are well acquainted with the symptoms these stages present. Diarrhœa, sickness, and fretfulness, are frequent. The child carries its fingers impatiently to the mouth; but if there are no signs of a coming tooth, the cause of irritation is little suspected.

Cases of mismanagement during teething which have come under observation illustrate thousands of others. A thoroughly healthy child that has been properly fed (*i. e.*, on milk), suddenly, perchance, shows disturbance of health; the mouth is hot, the child is fretful, and cries from thirst. Instantly he is supposed to be hungry. A meal is given, which is almost immediately rejected. After a little time the fretfulness increases; food is again administered with the same result. The nurse now exclaims that "milk no longer agrees with the child; it is too poor; and that better food must be given." The mother becomes alarmed, and, without consulting a medical man, adopts the nurse's views. Arrowroot, sago, tapioca, baked flour, tops and bottoms, beef-tea, veal and mutton broth, are all tried in succession, and found not to agree. Still a prey to anxiety, the parent asks advice of every matron within reach; innumerable remedies are tried; finally diarrhœa or convulsions set in. Then the doctor is sent for. He does what he can to palliate suffering, but the healthy constitution of the child has usually sustained a shock which remedial measures are long in removing.

Too frequently, diseases thus originated run their course, and the life of the little one is sacrificed. Death is then ascribed to "teething." But if a post-mortem examination were made, would the seat of disease be found in the mouth, or in the disordered regions of digestion? Granted that the natural food disagreed with the infant for a time; granted that the irritation extended to the coats of the stomach; are these any reasons why the unoffending member should have been loaded with a description of food to which it had hitherto been unaccustomed? Would

it not have been better to suffer the irritation to subside, to let the stomach rest for a while, instead of heaping on it double work? In any case, would it not have been safer to wait until signs of exhaustion were apparent, or traceable to want of better nourishment? After a few days' watching, giving less, instead of more food, the appetite would, in all probability, have returned.

The lesson which these disastrous consequences teach us is, *never to change an infant's food when the eruption of a tooth may naturally be expected.*

After the first four front teeth are cut the infant should not derive its nourishment solely from its mother; it should be allowed one or two meals a day of milk, thickened with biscuit, or corn-flour, or maizena, or well-baked bread. It may have a crust or piece of biscuit to suck. After the appearance of the second four teeth next the front, the baby should be completely weaned, and a small quantity of chicken, veal, or thin mutton broth, or beef-tea, or a little bread and gravy (the juice of meat), or a piece of beef underdone and juicy, which the child can suck, may be allowed occasionally. Abundance of good milk must still be the staple nourishment of the child, for nothing else will take its place effectually in building up the healthy infant frame.

The dietary may become more varied as the child grows older; the yolk a raw egg occasionally, a little bread and meat juice, or well-boiled rice with potato, or alone, a little bread and butter, or a rusk, to exercise its newly-cut teeth upon, may be allowed; and after sixteen to eighteen months a little finely-minced or pounded meat may be given every day with the gravy; or the meat may be given on alternate days to begin with. The tendency at this age is for mothers to allow their infants to have pickings of everything on the table, from plum-pudding and beef-steak to cheese and celery; the child has only to cry successively for a bit of everything on the table, and it is supplied forthwith.

There are numerous kinds of artificially prepared foods for infants, all of which consist of farinaceous material, i. e., starch in some form or other, rendered soluble and digestible by some process, either of heat or fermentation. They are nutritious and useful when added to milk or given as a separate meal in the form of custard, but *they are quite unfitted to replace milk.* An excellent, and perhaps the best of all the artificially prepared foods for infants, is within the reach of every mother or nurse. It is prepared in the following manner: — Take the best wheat flour in sufficient quantity to last for a week, put it dry into a proper cloth or bag and tie up closely, and boil in the same way as a batter pudding, for from *four* to *six* hours. When cold, a sufficient quantity can be grated or rubbed down fine and used in a similar way as other prepared foods, by the addition of water with a little milk, if need be, with a little salt and refined sugar, the flour being thus cooked a *second time* during the process of making into a very thin gruel.

The diseases of children are very numerous, and some are, at least in the present state of sanitary science, inevitable; but a still greater number may be prevented by careful attention to cleanliness and proper feeding, ventilation of rooms, and the avoidance of exposure to cold and damp. In the carrying out of all these necessary conditions of health, the poor meet with far greater difficulties than the rich; difficulties, many of which they cannot, unaided, wholly surmount; but it is not the less certain that disease among the children of even the very poor may be much diminished by the carefulness of the mothers in carrying out, so far as they are able, the common-sense rules of health.

Children may inherit a tendency to many diseases, of which mental disease, and scrofulous affections, are the most common; but we say advisedly that they inherit a *tendency* to these diseases, for they can rarely be said to inherit the diseases themselves, most of which do not appear until after the period of childhood, and may, by ju-

dicious foresight and management of the health in childhood, be altogether warded off.

Before proceeding to discuss separately a few of the more common diseases of infants, we must first state that our principal object in doing so is to give such information as may lead to the prevention of those diseases which are preventible, and to the early detection of those which are not; and though we may add such hints on treatment as may be safely followed by a judicious mother or intelligent nurse, we purposely abstain from doing more. Medical advice must always be obtained in serious illness; and as there are no diseases so hopeful to treat, so there are none so dangerous to neglect, as those of infants and children.

Thrush is one of the earliest of the acquired diseases of children; it may occur at any time after birth. In this disease the tongue, throat, and inside of the mouth are covered more or less completely with small white specks, like minute flakes of milk; there is considerable dryness and soreness of the mouth; the infant is fretful, its cry hoarse; diarrhœa commonly comes on towards the end of the attack. This disease is very liable to attack weakly infants, but with great care may almost always be prevented. It commonly supervenes towards the termination of exhausting diseases, and is then often a fatal symptom. It is due to a vegetable parasite of the fungus tribe, which is developed in any sour milk or saccharine substance which may adhere to the mouth of a delicate infant, or it may find a lodgment in the altered secretions of the mouth in exhausting diseases. One of its most fruitful sources is the sugar and butter and gruel given to the newly-born infant; want of cleanliness is another common cause. In the treatment of this disease, the feeding apparatus must be carefully looked to, everything coming into contact with the infant's mouth must be kept absolutely clean, the mouth must be carefully cleansed after feeding, with a moistened cloth, or a teaspoonful of clean water, or water containing chlorate of potash (ten grains dissolved in an ounce) given after every meal. Though a serious malady, thrush is rarely of itself fatal.

Diarrhœa is a very common disease among infants. Leaving out of consideration irritant poisons and epidemic influences, it is caused principally by—(1) errors in diet; (2) rapid changes of temperature; (3) nervous irritation—*e. g.* teething; (4) the subsidence of an acute disease. The first impulse of the mother or nurse is usually at once to check the diarrhœa with a dose of chalk mixture—this should not always be attempted.

The diet must be always rigidly inspected on the occurrence of diarrhœa. The infant may be fed too frequently; there may have been previous irregularity of the secretions; the mother may have taken some article of diet which disagrees with the baby; if weaned, the milk may be too heavy, or slightly acid; in these cases there is commonly sickness accompanying the diarrhœa, and the infant suffers much from cramp and flatulence. A preliminary small dose of castor-oil, a return to proper diet, the dilution of the milk with one-third or one-half of lime-water, and warm flannels to the stomach, will in these cases very likely restore the infant again to comfort; if not, further advice must be sought.

Diarrhœa from rapid changes of temperature may be prevented by flannel bandages applied to the stomach (which are often left off much too soon), carefully keeping the feet warm, avoiding draughts, and early accustoming the child to daily cool or cold sponging. Some children are more subject than others to this form of diarrhœa; it is more common in summer than in winter, because at this time, owing to light clothing and greater exposure in the open air, children are more subject to cold chills. A teaspoonful of chalk mixture, or a little peppermint, will usually check it. When cholera is prevalent, all cases of diarrhœa, even the most trivial, should be at once attended to.

Whilst teething, infants are very liable to attacks of diarrhœa; these

attacks are often very irregular, severe while they last, and perhaps followed by constipation; the infant is much distressed with flatulence, and is very fretful and feverish. On examining the mouth it is perhaps seen that one or more teeth are making their way through the gums, giving rise to much irritation, causing swelling and heat of the gums, a great flow of water from the mouth, or in more severe cases dryness of the gums and mouth generally.

In managing the diarrhœa of infants who are cutting their teeth, it must be borne in mind that, as we have before pointed out, the diarrhœa may not, and commonly is not, due to the irritation in the gums alone acting on the secretions through the nervous system; the whole alimentary canal of the infant is at this time in a state of great activity; the numerous glands with which it is plentifully supplied are growing very fast; and consequently any little error in diet, so small as scarcely to be avoidable, or any irritating material in the bowels, may very readily give rise to diarrhœa. It is often advisable, therefore, to give a little rhubarb and magnesia, or a small dose of castor-oil, before trying directly to check the diarrhœa, and this simple expedient often suffices to arrest it. The opposite plan of immediately giving some drug to check the diarrhœa is much to be deprecated, since, if the secretion be too suddenly stopped, more serious symptoms, such as bronchitis, or inflammation of the lungs, or convulsions, may arise. It is sometimes most difficult to improve the disordered condition of the bowels in infants while teething: a total change in diet, the substitution of prepared food for the milk, or giving animal food alone in the form of finely pounded and prepared raw meat, may be necessary; but in all such cases medical advice is indispensable.

In some cases the diarrhœa arising from any cause takes on a dysenteric character, and the little sufferer is reduced to the lowest possible condition, which not uncommonly proves fatal, and always requires much skill and attention, both on the part of the doctor and nurse, for its successful treatment.

Sometimes, at the end of an attack of measles or other acute illness, a sharp attack of diarrhœa comes on; this should not be hastily checked, as it is usually of a salutary character.

It is particularly important, on account of the feverishness to which an infant is subject during the period of teething, to secure it against the cold, and especially to keep it out of draughts, care being taken at the same time that the air is kept pure by proper ventilation. Children during this period are very subject to attacks of bronchitis, which are often very serious; they are often, too, seized with much 'wheezing' on the chest, and seem to be about to have some very severe chest complaint; but the symptoms pass off as suddenly as they appear. Restlessness at night is commonly associated with the feverishness of teething: a warm bath before going to bed is a very useful remedy for this; *opiates* or *soothing syrups*, most of which contain opium, *should never be given;* the slumber they produce in these cases is unhealthy and unrefreshing. In the event of any nervous symptoms arising, as spasmodic croup, or convulsions, the infant should immediately be placed in a warm bath, and medical aid should be sent for.

The tretament of an infant undergoing the critical process of dentition, should consist in strict observance of the rules of health. More air, more water, more repose, are needed; and *greater regularity in feeding should be observed.*

CURE OF STAMMERING.—The effectual cure mainly depends upon the determination of the sufferer to carry out the following rule: Keep the teeth close together, and before attempting to speak inspire deeply; then give time for quiet utterance, and after very slight practice the hesitation will be relieved. No spasmodic action of the lower jaw must be permitted to separate the teeth when speaking. This plan, regularly carried out for six months, cured me when twenty years old. I was painfully bad, both to myself and to others. Without determination to follow out the plan, it is of no use attempting it.

DREAMS.

WHETHER our views are materialistic or spiritual, we must adhere to the principle that mental activity is inseparably connected with the brain. It is the instrument by which the soul manifests its activity, and, as from an imperfect instrument the most skilful performer can produce only imperfect music, so the capabilities of the mind are dependant upon the state of the brain. As in sleep its nourishment is considerably lowered by the diminished supply of blood, so also, as Durham's experiments upon sleeping animals, whose skulls he partially opened, have shown, the arterial, that is, the oxygen bearing vessels, are more contracted and less abundantly filled than in the waking condition, and, consequently, the capability of the brain is much less. Mental activity is reduced to a minimum, and especially must all complicated processes, above all things the judgment, come to a pause. Still our thoughts and ideas continue to spin themselves out even in sleep, according to the same indestructible law as they do when we are awake, but they lack the regulating and limiting conduct of the judgment and the understanding. This partial activity of the brain is to dream.

The dream is not a dark and inexplicable something of whose origin we are ignorant; it is a product of the same brain function which is active in our waking state. Our thoughts in dreaming depend as much upon the association of ideas as they do when we are awake. In accordance with this law every idea immediately on its rise calls up a series of other ideas connected with it by resemblance of circumstance, similarity of sound in the words which express it, or agreement in the order of time, etc.

In the waking state the judgment always exercises a restraining influence upon the play of our fancy, and prevents us from joining together the unusual and incongruous; but in sleep our ideas are associated in the lowest manner. When we are awake one idea follows another; but when we are asleep, several ideas simultaneously present themselves, and, uniting together, form themselves into one complex whole; or, from the rapidity with which they follow each other, and the indistinctness of their connection, one idea unobserved takes the place of another.

In the waking state we can call up ideas by an effort of the will. We can think of what we wish. This, however, is not always the case. Very often it happens, as if by accident, that ideas spring from the treasure of our memory to which we voluntarily give further entertainment, or by which we are unwillingly led to other ideas distasteful to us. So also in dreams, where the voluntary calling up of any given idea is impossible, the mind is led to involuntary activity by means of ideas stored up in the memory. Most frequently the first impetus to a series of dream-pictures is given by some marked and striking impression which has been made upon us during the day, or by thoughts which have occupied our minds shortly before falling asleep. These ideas are often uninterruptedly continued; but not less often we are rapidly led to other ideas, and we are then unable to detect the connection between the two.

When we are awake the impressions of the senses are by far the most prolific source of mental activity. But in sleep, as we have seen, the senses have ceased to exercise their functions, though still, to a certain extent, capable of excitement. Under strong impressions the senses of hearing and of feeling are susceptible even in deep sleep, but the resulting idea is almost always confused, and often an entirely different image is presented; just as in the twilight we sometimes take the trunk of a tree for a man sitting by the wayside. The indistinctness of the impression made upon the senses allows the fancy to fill it up in its own colors, and so it comes to pass that any excitement of the sense of hearing or

feeling in sleep gives occasion for dreams, of which only the most general outline originates in external conditions. There are many examples of this on record. Meyer narrates that he once dreamed that he was attacked by robbers, who laid him full length on his back upon the ground, into which they drove a stake, passing it between two of his toes; but on awaking he found that these two members were only separated by a straw!

Another relates that, having a bottle of hot water placed at his feet, he dreamed that he had reached the top of Etna, and was treading on burning lava. In a similar manner, if we are uneasy in bed and throw off the covering, we dream that in the cold of winter we are wandering half-clad through the streets; or, if there is a strong wind blowing, we dream of storms and shipwreck; or a knocking at the door produces dreams of an attack by thieves. It is very seldom that words spoken in sleep are distinctly understood, and equally seldom that they call up in the mind of the sleeper the idea they represent. I may mention an instance or two in which dreams could be controlled in this way. Dr. Abercrombie relates that an English officer who accompanied the expedition to Ludwigsburg in 1758 dreamed, to the great delight of his comrades, any kind of dream they chose, according to the words they whispered in his ear. Another example is given by Kluge: a rejected lover, who had secured the favor of the lady's mother, obtained permission to whisper his name in her ear while she slept. Very soon there was a remarkable change in her conduct towards him, and at last she gave him her hand. On being questioned about the change, she replied that she had become attached to him, in vivid and oft repeated dreams. For the truth of this story we cannot vouch; at the same time we do not deny its probability.

The excitement of the internal susceptibilities gives occasion for dreams almost more frequently than the external senses. By internal susceptibilities I mean those sensations which indicate to us the position of our internal organs, and which are usually known as general feelings, and to which belong the condition of being well and unwell. These sensations come within our consciousness during sleep, but, as might be expected, darkly and indistinctly. Connected with them in a similar manner as with the impressions of the external senses, are certain symbolic dream-pictures, the most common of which is nightmare. This originates in a cramped condition of the respiratory muscles, and a consequent difficulty of breathing. Similar results will follow if the stomach be overloaded, for it then presses upon the diaphragm, and thereby confines the lungs. When we are awake we trace this disordered respiration to its correct cause — namely, a local affection of the organs of the chest, and there it ends; but in sleep we are incapable of this reasoning, and therefore, in harmony with the law of association, there arises from the feeling of oppression the idea of weight and the image of a superincumbent object. We also dream of heavily laden wagons passing over us, or of dark, shadowy apparitions emerging from the ceiling and gradually settling down upon us.

Not unfrequently we find that, instead of this, we dream of some great trouble or sudden fright, for in the waking state experiences often render respiration difficult. We then dream, for example, that we are attacked by robbers; and when we endeavor to secure our safety by flight, we find, to our consternation, that our feet refuse to serve us, and we remain, as it were, rooted to the ground. We try to call for help, but find that we are unable to produce a single sound, until at last, after long struggling, the muscles of respiration are released from their restraint, and we awake — sometimes with a loud cry.

In a similar manner is experienced the dream of falling from a great height. It usually happens while we are falling asleep, and depends upon the circumstance that the gradual relaxing of the muscles caused by sleep is, by some momentary excitement, re-

versed, and the result is a shrinking back of the body similar to that experienced in falling from any lofty position. Somewhat different from this is the dream of flying. According to Scherner it depends upon our consciousness of the action of the lungs, their rising and falling motion giving to us in our dream the notion of flight. There are a great many more conditions of the body which, if they come into our consciousness during sleep, awake in us, in harmony with the law of the association of ideas, a certain kind of dreams. The emotions also produce a definite impression upon their character. "Great joy," some one has written, "originates a different class of dreams than great sorrow; and ardent love gives rise to dreams not produced by hatred, deep repentance, or an accusing conscience."

If we accustom ourselves attentively to notice our dreams, we shall easily perceive the confirmation of the law laid down. But we shall also find that it is exceedingly difficult to reproduce a dream correctly. It is so for two reasons. The imagery of dreams, in by far the greater number of cases, is so indistinct and shadowy, and in its particulars so inadequate, that by the effort to recall them, we involuntarily bring to our help the imaginative power of our waking moments, and thereby give to them definite color and outline. The other reason is, the innate tendency of the human mind to look at all things in their logical connections. When our dreams consist of a series of pictures, often connected only by the very loose bond of the association of ideas, we bring to them by their reproduction, unintentionally, of course, a logical connection and correspondence with the real life which originally they did not possess.

During the period of deepest sleep the function of the brain is so weakened that we retain no recollection of it, and sound sleep has, therefore, come to be called a dreamless sleep. Sometimes we know that we have dreamed, but are wholly unable to recall a single trace of that which has engaged our sleeping thoughts. But shortly before we awake, when the oxygen stored up in the blood corpuscles begins to bring the process of waste and repair in the brain into more energetic operation, our dreams become more lively and connected, and, for this reason, are more easily retained by the memory. The cases are very few in which dreams are so vivid that we are unable to distinguish them from real events. Professor Jessen, a celebrated physician to the insane, gives a striking ex-example, in the following words:

"One winter morning, between the hours of five and six, I was awoke, as I believed, by the head keeper, who informed me that the friends of a patient had come to remove him, and at the same time he inquired whether anything required mention. I replied that he might permit the patient to depart, and immediately lay down again to sleep. I had no sooner done this than it occurred to me that of the intended removal of this patient I had heard nothing, but that it was of the departure of a woman of the same name I had been advised. I was compelled, therefore, to seek further information, and, having hastily dressed myself, I went to the dwelling of the keeper, whom, to my astonishment, I found only half clad. Upon my asking him where the people were who had come to fetch away the patient, he replied, with surprise depicted in his countenance, that he knew nothing of it, for he had only just risen, and had seen no one. This reply did not undeceive me, and I rejoined that it must have been the steward who had visited me, and I would go to him; but as I was descending the steps which led to his house it struck me that the whole affair was a dream — a fact, however, which I had not until that moment suspected."

This example is particularly interesting from the length of time which elapsed after the professor awoke, and during which he had been thoroughly aroused by the act of dressing and going to the keeper, yet the delusion which regarded the dream as a reality continued, and at last, without any apparent cause, suddenly vanished.

Proportionately more frequent are the cases where the awaking is imperfect, but still sufficient to induce a course of action corresponding with the supposed realities of the dream. There are instances on record where people, deceived by the alarming imagery of a dream, have committed acts of violence for which they could not be considered responsible.

An interesting example of insubordination during heavy sleep is related by Büchner, in Henke's *Journal of Medical Jurisprudence :*

"Christian Junger, a soldier of the guards, two and twenty years of age, and who had been three years in the army, a man of good character, fell asleep about noon upon a bench in the guard-house. The corporal endeavored to awake him, in order to sweep out the room. Junger arose, and, without saying a word, seized the corporal by the breast, then drew his sabre and made an attack, which the corporal succeeded in parrying. He repeated the attempt, however, and did not desist until disarmed and arrested by the soldiers present; he then sat down quietly upon the bench. On the preceding day, and on the morning of the deed, he had kept guard at an exceedingly cold and exposed situation; the intervening night he had spent in playing at cards, but had drunk little, and in the morning, from sheer weariness, he fell asleep in the heated guard-house. On the examination it appeared that he dreamed he was on guard, when a fellow seized him by the hair, and took his rifle, upon which he drew his sabre and made an attack upon him. Of that which really passed he knew nothing. He could not understand that he, who had always been obedient to his superiors, should have been guilty of insubordination. The medical evidence showed it to be a case of 'sleep-drunkenness,' and he was acquitted."

In explanation of this case something further may be said. Similar results might be brought about by toil of any kind; but here, by keeping guard, and the consequent excessive exhaustion, the deficiency of oxygen was brought to an abnormal height, and the small quantity taken in during the short sleep was not sufficient to restore the brain to its full activity.

From an article in "Chemist and Druggist," by Ewald Hecker.

Infant Prodigies, who can repeat "Young's Night Thoughts" without a blunder, or tell the distance between Jupiter and the earth without misquoting a cipher, are not to be encouraged in these feats of mental agility, but should rather be taught the use of the skipping rope, or indulge in the *abandon* of a game at bat, trap, and ball. We see that mental precocity is only the too sure sign of cerebral disease; and if parents are foolish enough in their pride of these infant prodigies to foster this precocity, they are acting the part of literary medeas; killing their offspring more slowly, but no less surely.

Abernethy's Dislike to Unnecessary Talk.—People who came to consult this eccentric man took care not to offend him by bootless prating. A lady on one occasion entered his consulting-room, and put before him an injured finger, without saying a word. In silence Abernethy dressed the wound, when instantly and silently the lady put the usual fee on the table and retired. In a few days she called again, and offered her finger for inspection. "Better?" asked the surgeon. "Better," answered the lady, speaking to him for the first time. Not another word followed during the rest of the interview. Three or four similar visits were made, at the last of which the patient held out her finger free from bandages and perfectly healed. "Well?" was Abernethy's monosyllabic inquiry. "Well," was the lady's equally brief answer. "Upon my soul, madam," exclaimed the delighted surgeon, "*you are the most rational woman I ever met with.*"—*Jeaffreson's Book about Doctors.*

Hair-Dye.—It is asserted that eight per cent. of the lunatics in Charenton Asylum, France, are victims to the use of hair-dye.

OZONE.

THE singular gas termed ozone has recently attracted a large amount of attention from chemists and meteorologists. The vague ideas which were formed as to its nature when as yet it had been but newly discovered, have given place gradually to more definite views; and though we cannot be said to have thoroughly mastered all the difficulties which this strange element presents, yet we know already much that is interesting and instructive.

We recognize in ozone a sort of concentrated oxygen, with this peculiar property, that it possesses an extraordinary readiness to part with its characteristic third atom, and so disappear *as ozone*, two-thirds of its weight remaining as oxygen.

It is to this peculiarity that ozone owes the properties which render it so important to our welfare. We are indeed, as yet, in no position to theorize respecting this element, our knowledge of its very existence being so recent, and our information respecting its presence in our atmosphere being of still more recent acquisition.

Indeed, it is well remarked by Mr. Heaton, that we had, until quite lately, no reason for confidently adopting Schönbein's view that ozone exists in our atmosphere. The test-papers which Schönbein made use of turned blue under the influence of ozone, it is true, but they were similarly influenced by other elements which are known to exist in our atmosphere, and even the sun's rays turned them blue. However, Dr. Andrews has shown how the character of the air producing the change can be further tested, so as to render it certain that ozone only has been at work. If air which colors the test-papers be found to lose the property after being heated, the change can only be due to ozone, because nitrous and nitric acid (which have the power of coloring the test-papers) would not be removed by the heat, whereas ozone is changed by heat into oxygen.

Once we are certain that ozone exists in the air, we must recognize the fact that its presence cannot fail to have an important bearing on our health and comfort; for ozone is an exceedingly active agent, and cannot exist anywhere without setting busily to its own proper work. What that work is, and whether it is beneficial or deleterious to ourselves, remains to be considered.

In the first place, ozone has immense power as a disinfectant. It decomposes the products emanating from putrifying matter more effectually than any other known element. Perhaps the most striking proof ever given of its qualities in this respect is that afforded by an experiment conducted by Dr. Richardson a few years ago.

He placed a pint of blood taken from an ox in a large wide-mouthed bottle. The blood had then coagulated, and it was left exposed to the air until it had become entirely redissolved by the effects of decomposition. At the end of a year the blood was put in a stoppered bottle, and set aside for seven years. "The bottle was then taken from its hiding-place," says Dr. Richardson, "and an ounce of the blood was withdrawn. The fluid was so offensive as to produce nausea when the gases evolved from it were inhaled. It was subjected by Dr. Wood and myself to a current of ozone. For a few minutes the odor of ozone was destroyed by the odor of the gases from the blood; gradually the offensive smell passed away; then the fluid mass became quite sweet, and at last a faint odor of ozone was detected, whereupon the current was stopped. The blood was thus entirely deodorized; but another and most singular phenomenon was observed. The dead blood coagulated as the products of decomposition were removed, and this so perfectly, that from the new clot that was formed serum exuded. Before the experiment commenced, I had predicted on theoretical grounds that secondary co-

agulation would follow on purification; and this experiment, as well as several others afterwards performed, verified the truth of the prediction."

It will of course be understood that ozone in thus acting as a disinfectant is transformed into oxygen. It parts with its third atom as in the mercury experiment, and thus loses its distinctive peculiarity. Thus we might be led to anticipate the results which come next to be considered.

Ozone has certain work to do, and in doing that work is transmuted into oxygen. It follows, then, that where there has been much work for ozone to do, there we shall find little ozone left in the air. Hence, in open spaces where there is little decomposing matter, we should expect to find more ozone than in towns or cities. This accords with what is actually observed. And not only is it found that country air contains more ozone than town air, but it is found that air which has come from the sea has more ozone than even the country air, while air in the crowded parts of large cities has no ozone at all, nor has the air of inhabited rooms.

So far as we have gone, we might be disposed to speak unhesitatingly in favor of the effects produced by ozone. We see it purifying the air which would otherwise be loaded by the products of decomposing matter, we find it present in the sea-air and the country air, which we know to be so bracing and health-restoring after a long residence in town, and we find it absent just in those places which we look upon as most unhealthy.

Again, we find further evidence of the good effects of ozone in the fact that cholera and other epidemics never make their dreaded appearance in the land when the air is well supplied with ozone — or in what the meteorologists call "the ozone-periods." And though we cannot yet explain the circumstance quite satisfactorily, we yet seem justified in ascribing to the purifying and disinfecting qualities of ozone our freedom at those times from epidemics to which cleanliness and good sanitary regulations are notedly inimical.

But there is a reverse side to the picture. And as we described an experiment illustrating the disinfecting qualities of ozone before describing the good effects of the element, we shall describe an experiment illustrating certain less pleasing qualities of ozone, before discussing the deleterious influences which it seems capable of exerting.

Dr. Richardson found that when the air of a room was so loaded with ozone as to be only respirable with difficulty, animals placed in the room were affected in a very singular manner. "In the first place," he says, "all the symptoms of nasal catarrh and of irritation of the mucous membranes of the nose, the mouth, and the throat were rapidly induced. Then followed free secretion of saliva and profuse action of the skin — perspiration. The breathing was greatly quickened, and the action of the heart increased in proportion." When the animals were suffered to remain yet longer within the room, congestion of the lungs followed, and the disease called by physicians "congestive bronchitis" was set up.

A very singular circumstance was noticed also as to the effects of ozone on the different orders of animals. The above-mentioned effects, and others which accompanied them, the description of which would be out of place in these pages, were developed more freely in carnivorous than in herbivorous animals. Rats, for example, were much more easily influenced by ozone than rabbits were.

The results of Dr. Richardson's experiments prepare us to hear that ozone-periods, though characterized by the absence of certain diseases, bring with them their own forms of disease. Apoplexy, epilepsy, and other similar diseases seem peculiarly associated with the ozone-periods, insomuch that eighty per cent. of the deaths occurring from them take place on days when ozone is present in the air in larger quantities than usual. Catarrh, influenza, and affections of the bronchial tubes, also affect the ozone-periods.

We see, then, that we have yet much to learn respecting ozone before

we can pronounce definitively whether it is more to be welcomed or dreaded. We must wait until the researches which are in progress have been carried out to their conclusion, and perhaps even then further modes of inquiry will have to be pursued before we can form a definite opinion.

CITIES.

CHANGE of scene is what you need." "With all my heart! I have no objection to that prescription; but I prefer taking it here, at my own fireside."

The doctor stared. I went on —

"Why should I, — something of an invalid, little inclined for exertion of any sort, surrounded by home comforts, and, what is more, thoroughly appreciating them, — why, I say, should I undergo the worry of packing up, or the fatigue of an ordinary journey, when one moment, one effort of the imagination, will suffice to transport me to any part, already familiar to me, of the habitable globe; and, take it all in all, I have been something of a traveller? Do you recommend a warm climate? What say you to Rome, or Naples? I am ready to follow your advice; but it must be here, in this arm-chair, in my own study, and by the blaze of the same fire that has seen me swallow your other prescriptions, — those little rose or saffron-colored draughts, which work, of course, such wonders. I will take my change of scene here, also, if you please."

The doctor, staring still, lingered, hat in hand, to repeat once more before he left me, —

"Run over to Paris for a week or two: change is what you need."

I watched him walk down the garden to the little gate, where his gig stood waiting; I noticed that the doctor buttoned his great-coat across his chest, and that he scowled up at the sky, as the best of people will scowl in the face of an east wind; for the season was spring. What were the poets about that they could sing its praises? Or was the world really young once, and is it young again once in a lifetime to us all? To prosaic people like myself, spring does not suggest the idea of youth, there being a prevailing chill and bitterness about it which are apt to make one feel prematurely old.

The doctor having departed, I prepared at once to obey him. The sky was full of clouds hurrying before the wind; the very sunshine looked cold. Surely, in our variable climate, we possess one advantage calculated to make us the best travellers in the world, — it ought to be hard for any other climate to take our constitutions by surprise, — without leaving the shores of this eccentric land, we gradually become acclimatized to them all. Last summer, although it was one of the coldest on record, there were two or three days which must have been good training for the tropics, — days when men from India complained that they had rarely felt it hotter in Calcutta, — a statement probably suggested by the fact that *here* they had no punkahs; and this very morning, although my room is redolent of the scent of violets, gathered but two days ago, there is snow upon the ground, and my fingers stiffen as I hold the pen.

It is worthy of passing remark, too, that foreigners do rarely become reconciled to a long residence. The Italian will never cease to mourn for the warmth of his native sun, the Frenchman to sigh for his clearer atmosphere; even our German brothers complain bitterly; and as for natives of the tropics, or unfortunate specimens of humanity from the Arctic circle, they simply die. But we can live anywhere; doubtless, all owing to the sudden changes of temperature to which from infancy we are accustomed. Two days ago, open windows, sunshine, violets; at this moment, a blaze upon the hearth and east wind!

But now for the doctor's prescrip-

tion. I think I will betake myself to cities, delaying only long enough to fix upon the one whose character best corresponds with my present mood. Every city has an individual character of its own, of which we feel the influence, — a *something* stamping its impress on the outward aspect exactly as the disposition or the predominant passions stamp their likeness on a man's features.

To convey the idea of excitement, there is no city comparable to Paris. She stands alone. Who that knows her cannot see the character of the French people personified, as it were, in their capital? Gay, intoxicating, bewitching, fickle Paris! And is not Florence pleasure? Brussels is a pleasant vision, with her boulevards, her park, her quite sufficiently brilliant society, — a vision of a gay, sociable, altogether smiling place; but the colors are to some degree toned down, perhaps, by the Flemish school of painting, or by the sober glories of St. Gudule.

But Florence the Beautiful, lying in the enchanting Val d'Arno, nestling amongst the flowers, while the "purple Apennines" stand round guarding her soft beauty, is she not the fitting image of some lovely lady who troubles herself in this work-a-day world no more than do the lilies of the field, whose vocation it is simply to look lovely, to please and be pleased? She is garlanded with flowers, crowned with them, decked out with living jewels. Passing through her flowery suburbs, the eye lingers on the outline of the largest dome in the world — itself the dome of St. Maria dei Fiore.

I do not for an instant mean to disparage the arts and industries of Florence, — this city where Giotto's Campanile points to heaven, and where the gates of the Baptistry of St. John might be "gates of Paradise"; still less would I ignore the *history* of a town where certainly, at one time, every citizen was a politician, — the town of the Medici, birthplace of Dante, and whose streets were trodden by Savonarola. But it is always my habit on first visiting a city to take, if possible, from some eminence a bird's-eye view, then wander amongst its streets and squares, and mark what manner of spirit it is of, — not what the people are about, or what spirit possesses *them*, but only of what the outward aspect of the place itself is, to my imagination, the embodiment.

Naples contrasts while harmonizing with Florence. Pleasure reigns supreme on the Chiaja, among the orange groves, in the whole bay over which Vesuvius stands sentinel; but here there is a languid leisure for which the Tuscan capital is too bright; here our lovely lady, reclining on the shore of the tideless sea, is somewhat enervated by her devotion to pleasure: she indulges in a luxury of idleness. Heaven knows, the Neapolitans are energetic enough! exhaustingly so. Their harsh *Che*, *che*, hurts the ears attuned to the musical *lingua Toscana in bocca Romana.* It is not of the Neapolitans, however, that I am speaking, but of Naples. Naples, as I have seen her from the orange gardens of Sorrento, — a fair, sleepy city; a lazy column of smoke ascending from Vesuvius; lazy white sails seeming scarcely to move as they float over the blue bay; idleness brooding over everything, especially over the lazzaroni lying on the shore,— *molto macaroni*, and very little to do for it, being with them a fixed principle of life.

Apropos of macaroni, I once heard of a school-room manual of geography which professed, after describing various countries, to give a description of their inhabitants also. Under the head of "Manners and Customs," the characteristics of the people of Italy were thus summed up: "The Italians *eat macaroni and are revengeful!*"

All beauty is melancholy, and Genoa is beautiful exceedingly. To me she represents the poetry of sorrow. Through the steep, narrow streets, — streets of marble palaces whose glory is departed, — the figures of white-veiled women flit. There is a mysterious gloom over the city, as though she herself were also veiled; the harbor is crowded with shipping, through which our little boat with difficulty finds its

way to the open water beyond; the sun is setting, but one wonderful rock has gathered all the sunset colors to itself, and stands strangely glowing against the sky. Above the town are hills, stern and rocky; they seem to throw the shadow of a past grief upon the place, and to whisper of trouble yet to come; the sea, answering, murmurs of sorrow also.

The melancholy of Siena, on the other hand, is purely religious. I speak of "my" Siena, not knowing what that of other people may resemble. In mine, the sad rain falls; it is Holy Friday, and the cathedral, inlaid with black marble outside, is hung inside with black also, draped in black. The wondrous pavement, unique in its gray tints upon pure white, harmonizes with all else to-day; there is no sound but that of the falling rain and the hushed tread of footsteps as the worshippers throng to kiss the great crucifix. The streets are as sombre and silent as the church; in them, also, there is no sound but the falling rain and the tread of passing feet moving through all the town towards the crucifix. The chief characteristic of the Sienese school of art is deep religious feeling; and the spirit of "my" Siena is religious sorrow; it is as though it were always Holy Friday there, or as though nowhere else could that day be fitly kept.

Yet, strange to say, the Piazzo del Campo recalls to my mind — of all places in the world — Frankfort, whose spirit is neither religion nor sorrow, but simple gravity; and this in spite of guide-books and manuals of geography, which, from my youth upwards, have informed me that it is "one of the liveliest of the free cities of Germany." "My" Frankfort is not "lively," and nowadays she is no longer free. I can fancy that she regards Prussia and the occurrences of the swift campaign of 1866, not with excitement or rage, but with a grave displeasure. A town whose principal business is banking or jobbing in the funds, how can it be "lively"? Were the Rothschilds merry in the cradle? The band plays in the garden on the river-side, but gravity is there too: on the anxious brows of stock-jobbing men; on the contented faces of their sober wives; on the calculating countenances of many Jews. Very grave is the "old" town, with narrow streets and quaint wooden gables; grave, too, is the town-house, and the thoughts suggested by the in no way remarkable portraits of the emperors which adorn its walls. Francis of Austria fills up the last space. What would they have done if others of the German line had reigned over free Frankfort later? One's thoughts fly to St. Paolo, beyond the walls, at Rome, where the portrait of Pius IX. fills up the last space amongst the medallions of the Popes. With Francis of Austria the German line of emperors ceased: there are not wanting those who whisper that with Pius IX. the priest-kings will end, — that the temporal power of Rome will not long survive him.

Ulm, too, is grave, but with a softened gravity of her own. Less business-like than Frankfort, the present does not so entirely monopolize the attention; there is time for a quiet thought of old days when the arts of civilization began to flourish here amongst the worthy burghers, although the nobles in the country round about were scarcely to be called civilized. I was once lost in Ulm. It was by night; the moonbeams were broken into gleaming fragments by the river's current; the stars shone; few people were stirring in the quiet streets, and I fancied that those I did meet — passing hastily along and speaking in low voices to each other as they went — conversed of some deadly feud between two noble houses, or of the Aulic Council, or the latest robbery of rich merchants by lawless barons. Finding myself in the public gardens, empty and silent now, and noticing a group of men engaged in eager talk, while two shadowy figures crossed the open space with rapid steps, methought they spoke of Theurdank, or whispered of the Turks, and dear friends captive among the infidels. Two girls, standing on the bridge in the moonlight, pointed across the water, away towards the

open country. They shivered. Were they thinking of the *Landsknechten*, and the treatment to be expected at their hands should they venture beyond the gates? I was half sorry to find myself again, which I did, in the modern inn near the railway station; and to awake to the remembrance that this is the nineteenth century, and Ulm as safe and prosaic as any other German town.

Ferrara is regret. Grass grows in her broad streets; her palaces are ruins; her seven miles of wall enclose now only a dwindled population; the people shrink together, crowd towards the centre of the city, and are but thinly scattered on the outskirts. Tasso's *gran donna del Po* is deserted by her many lovers; fondly she laments her princes of the house of Este. The present is nothing to her; her life is in the past.

To return to Germany. Grand old Heidelberg is also the image of one who has suffered, and whose glory is in the past; but Heidelberg is by no means melancholy — perhaps the sparkling, foaming Neckar has prevented that, and kept her cheerful; moreover, her sufferings were not from desertion, but from good hard blows in the wear and tear of life, from siege and fire; therefore it is that she personifies, not regret, but courage — courage triumphant over misfortune — or the beautiful evening of a stormy day. I think I will go thither. Standing on the castle terrace, one could pass an hour pleasantly enough, pondering of the Thirty Years' War, and how it thrust poor Germany far more than thirty years behind the rest of Europe; and with what plodding patience she has striven to regain her place in the march of nations — the damage being now at last repaired, strength and energy only now recovered. And, standing there, one might watch the dash and sparkle of Neckar down below, and the cloud-shadows chasing each other over the wooded heights, just as they chased each other all those three days when the ferocius Tilly gave up the town to be sacked — nature then, as now, troubling herself not at all for man's anguish, or for such trifles as fire and sword. But it was later than the Thirty Years' War, and at the hands of France, that Heidelberg suffered the worst, and by the French that the castle was finally destroyed — rendered uninhabitable, that is to say — destroyed as a Court Residenz, but left the very pride of castles and paradise of tourists. The inhabitants of the town may be forgiven if they idolize their noble ruin — I wonder whether they do, by the way, or whether they leave it to strangers to appreciate fully the majestic pile, and the beauty of Neckar's banks?

But it is time that I betook myself in good earnest to my prescription; and, perhaps, leisure would suit best with my present idle mood — the perfection of leisure in a gondola at Venice. How can one be hurried at Venice? In the golden evening air, the gay crowd loiters in the Piazzo San Marco; people sit idly outside *the* café — world-famed Florian's; the pigeons of St. Mark flutter fearless about our feet; in the streets is heard that indescribable rush and tramp of feet, the sound unbroken by roll of wheel or tread of horses; the gondola glides softly through the canals. It is all full of leisure, dream-like, unreal; the world is forgotten. We — being at Venice — pause in the stir of life, float on the waters of our fate, even as our gondola floats on those of the Grand Canal; we wait, lingering on the Rialto, or the Bridge of Sighs, and there is no hurry anywhere. Time enough to work when we are once more in the world; here, in the "Dream City," there is leisure. I have said, too, that it is spring; the clouds, scudding across the actually present sky, vanish; for at Venice in spring the sky is clear and unclouded. The canals are clear, too, and fresh, for the storms of winter have agitated and purified them; flowers bloom in the balconies, and there are, as yet, no mosquitoes. Decidedly, in this fireside travelling, I will betake myself to Venice.

As I arrive at this conclusion, I fancy that I can hear once more the far from brilliant remark so often uttered by a friend who once floated through the

canals with me. He could not get over the unwonted silence of the streets, the hushed sound of footsteps in them; at each turn his head was protruded from the gondola, he never wearied of exclaiming —

"Not a carriage to be seen! Upon my word, not a carriage to be seen!"

The novelty never ceased for him. We were there a fortnight, but he said it every day.

THE SPECTROSCOPE.

IT is only within the present century that the branch of optical science called "spectrum analysis" has been called into existence; and it is only within the last twelve years that it has really assumed a definite scientific shape.

Within this brief period spectrum analysis has enabled us to discover, not only numerous sources of known elements which before were considered very rare, but four entirely new elements — namely, cæsium, rubidium, thallium, and indium. It has also enabled us to discover to a great extent the nature of the elements composing the sun, fixed stars, comets, and nebulæ.

A glass *prism*, as almost everybody knows, is a triangular piece of glass, such as may be seen attached to lamps and chandeliers. If a beam of sunlight be allowed to fall on one side of this triangular piece of glass, the light will pass through one of the other sides; and if, after it is through, the light be received on a screen, wall, board, or any flat surface placed a few feet —say six or eight, or more — behind the prism, a band of rainbow colors will be seen on the screen, wall, or other surface upon which it may be received. This band of colors is called a *spectrum*, which is composed of the seven different colors of the rainbow —namely: red, orange, yellow, green, blue, indigo, and violet — and arranged precisely in the same order as in the rainbow. The spectrum becomes longer and longer, the farther the surface upon which it may be received is removed from the prism. This increase of length is owing to the prism having the power, not only of producing the seven colored lights from sunlight, but of bending — or *refracting*, as it is more generally called — the blue light much more than the red light. Across the spectrum, dark lines are found to exist at certain distances apart, somewhat like the rounds in a pencil sketch of a common ladder. It is by these we have been enabled to make all the discoveries attributable to spectrum analysis.

The spectral lines are rarely seen with the naked eye; up to a comparatively recent period they had been observed generally by means of a common telescope, which magnified eight or ten times; now they are observed by instruments, specially designed for the purpose, called spectroscopes.

It may be well to state, for the information of those who may not be acquainted with optical terms, that the *refracting angle* of a prism means the angle formed by any two of the sides through which the light enters and leaves the prism.

On account of their distinctness, and the facility with which they may be found, Fraunhofer distinguished seven of the spectral lines by the seven Roman capital letters, B, C, D, E, F, G, and H. Other lines less prominent were distinguished by other Roman and Italic letters. Of the seven principal spectral lines, B and C are in the red, D is in the orange, E in the green, F in the blue, G in the indigo, and H in the violet. Fraunhofer also examined the spectra formed by the planets and some of the brightest of the fixed stars. The spectral lines of the planets, in so far as he was able to observe, were found to be identical with the lines of the solar spectrum.

In a paper "On the Prismatic Decomposition of the Electric Light," read by Wheatstone before the meeting of the British Association for the Advancement of Science, held in Dublin in 1835, it was shown: 1st. That the spectrum of the electro-magnetic spark taken from mercury consists of seven definite rays only, separated by dark intervals from each other; these visible rays are — two orange lines close together, a bright green line, two bluish-green lines near each other, a very bright purple line, and lastly, a violet one. The observations were made with a telescope furnished with a measuring apparatus; and to insure the appearance of the spark invariably in the same position, an appropriate modification of the electro-magnet was employed. 2d. The spark taken in the same manner from zinc, cadmium, tin, bismuth, and lead, in the melted state, gives similar results; but the number, position, and color of the lines varies in each case; the appearances are so different that, by this mode of examination, the metals may be readily distinguished from each other. The spectra of zinc and cadmium are characterized by the presence of a red line in each, which occurs in neither of the other metals.

In the years 1851 and 1855, Masson, in the course of his investigation on electic photometry, examined the spectra produced by various metals which were employed as

dischargers to the Leyden jar, and also when heated by the voltaic arc; and gave drawings of the various spectra. Some discrepancies in the spectra of the same metals examined, both by Wheatstone and Masson, were subsequently explained by Angström, who showed that, owing to the intense heat of the electric discharges employed by Masson, he obtained two spectra simultaneously—one due to the metal, the other to the atmosphere itself, which became ignited. Certain lines observed by Masson as common to the spectra of all the metals were really those atmospheric lines. By causing the spark to pass between the same metals, when immersed in various gases, the particular lines due to the metal remained unaltered; whilst the others, due to the gaseous medium, disappeared and were replaced by new lines.

Professor Swan was the first person who endeavored experimentally to prove whether the almost invariably occurring yellow line may be solely caused by sodium. In his researches in 1856, "On the Spectra of the Flames of Hydro-Carbons," published in the "Transactions of the Royal Society of Edinburgh," vol. xxi., p. 414, he found that the yellow lines of sodium are visible when a solution is employed which does not contain more than 1-2,500,-000th part of a grain of sodium; thus showing the extreme delicacy of spectrum analysis.

Dr. Plucker, of Bonn, Germany, in 1858–59, published his investigations relating to the character of the electric light, produced by transmitting the secondary discharge from an induction coil through narrow tubes filled with gases, and subsequently exhausted as completely as possible. He found that each exhausted tube gave its own characteristic spectrum; and he measured and mapped with great care the principal lines visible in each.

Valuable as these researches and experiments of Wheatstone, Masson, Swan, Angström, Plucker, and others undoubtedly were, the great discovery of *the law of the spectral lines*, as well as the *proof of the truth of the law*, by simple yet beautiful experiments, was reserved for Professor Kirchhoff, of Heidelberg, Germany, by whom they were announced to the world in the year 1859. Kirchhoff's law of the spectral lines may be briefly stated thus: If a vapor, rendered incandescent by being raised to a high temperature, emits rays of certain refrangibilities — that is, of certain rainbow colors, or bent in the same degree as the rays of rainbow colors— when exhibited in the spectrum, the same vapor, when at a lower temperature, will have the property of *absorbing* those particular rays, or of replacing them by dark lines in the solar spectrum. Sodium (common table salt is nearly all sodium), for example, when ignited, emits brilliant orange light, which is concentrated into two lines in its spectrum, coincident in position with Fraunhofer's double black line D in the solar spectrum. If through a flame colored by sodium the more powerful electric light of the charcoal points, or ignited lime, be transmitted, the spectrum due to the stronger source of light is interrupted by a black line coincident with the solar black line D. Kirchhoff and Bunsen also ascertained that certain of the bright lines in the spectra of barium, calcium (lime), lithium, potassium (potash), and strontium, may likewise be reversed.

These facts have been applied by Kirchhoff to the explanation of the Fraunhofer lines, or dark lines in the solar spectrum, in the following manner: He supposes that, in the luminous atmosphere of the sun, the vapors of various substances are present, each of which would give its characteristic system of bright lines; but behind this incandescent atmosphere, containing metallic and other vapors, is the still more intensely heated solid or liquid nucleus of the sun, which emits a brilliant continuous spectrum, containing rays of all degrees of refrangibility. When the light of this intensely heated nucleus is transmitted through the incandescent atmosphere of the sun, the bright lines which would be produced by the incandescent atmosphere are reversed; and Fraunhofer's dark lines are only the reversed bright lines which would be visible if the intensely heated nucleus were no longer there.

Kirchhoff, who discovered, as already stated, the *general law* explanatory of the Fraunhofer lines, concludes, from his observations, that in the atmosphere of the sun the vapors of sodium, potassium, magnesium, calcium, chromium, iron, nickel, copper, barium, zinc, and, probably cobalt and manganese, are present; but that lithium and silver are not present there. Angström, an eminent Swedish physicist, besides confirming the discoveries made by Kirchhoff in the atmosphere of the sun, has discovered that hydrogen and aluminium, and, probably, strontium, are present there. It may be asked, How can these things be determined? By comparing simultaneously the solar spectrum with one of the spectra of the terrestrial elements, and by seeking out the bright lines in the spectrum of the terrestrial element corresponding in position with the dark lines in the solar spectrum. An objection may be urged against the conclusions drawn from this mode of investigation. The cause of the D line, for instance, in the solar spectrum, may exist in the earth's atmosphere. Kirchhoff, in his brilliant memoir, thus disposes of this objection:

1. "The necessary quantity of sodium in the gaseous form can hardly be present in our atmosphere, and the gaseous form is necessary to produce the effect in question.

2. "If the line D depended on our atmosphere, it would become more strongly marked when the sun approached the horizon. I have, however, never observed any such change in the distinctness of these lines; though, in the case of some of the neighboring lines, such changes are very conspicuous.

3. "If the line D were not caused by the physical constitution of the sun itself, it would exist in the spectra of all the fixed stars of sufficient brightness; but according to Fraunhofer and Brewster, it is wanting in the spectra of some of the fixed stars, though present in others."

The precise coincidence of the sodium lines with the D lines of the solar spectrum may be most satisfactorily proved by suffering the sun's rays to fall on the slit of the spectroscope through a sodium flame. The effect of the flame is exhibited in the increased distinctness, darkness, and breadth of the D lines. What has been stated concerning sodium is equally true of every other substance which, when placed in a flame of any sort, produces bright lines in its spectrum. If these lines coincide with the dark lines of the solar spectrum, the presence in the sun's atmosphere of the substances which produce them must be concluded.

The foregoing views of Kirchhoff are strongly confirmed by Angstrom, who, with true philosophic modesty, states that, "as the gases which immediately envelop the photosphere must be at a very high temperature, we are fully justified in applying the principle that these gases *absorb just the same kinds of light which they emit in a state of glowing heat.* Accordingly by seeking out the bright lines in the spectra of different metals which have corresponding dark lines in the solar spectrum, we can, with considerable probability, determine what metals in gaseous form enter into the composition of the solar envelope. I say 'only with considerable probability;' for, from the circumstance of two lines coinciding in both the spectra of the sun and of a given metal, it by no means follows as a necessary consequence that this substance is to be found in the sun; because, on account of the enormous number of dark lines in the sun's spectrum, such coincidence may be accidental; nevertheless, the probability of such an assumption increases in proportion to the number of such coincident lines and their phenomenal peculiarities."

Between the Fraunhofer lines D and F of the solar spectrum, Kirchhoff found no less than sixty lines having their corresponding lines in the spectrum of iron. Had chance alone governed the distribution of these sixty lines, the odds are more than 1,000,000,000,000,000,000 to 1 against all the sixty bright iron lines having fallen into coincidence with dark lines of the solar spectrum; or, stating the case otherwise, there are more than a trillion modes in which the sixty bright iron lines might be distributed among the dark lines, as regards coincidence and non-coincidence. Of these, the very mode which occurs — that of perfect coincidence — is that which would occur were there iron in the sun's atmosphere. We can scarcely doubt, then, that there was something more than chance in the matter, and the conclusion is irresistible that there is iron in the sun's atmosphere. It is proved, as Kirchhoff says, "with as great a degree of certainty as we can attain to any question of physical science."

It has been found that, of the principal Fraunhofer lines in the solar spectrum, B belongs to potassium; with regard to C, there is some difference among spectroscopists — the majority regard it as belonging to hydrogen. It must, however, be observed that, according to some careful experiments by M. Janssen, a distinguished French spectroscopist, C is caused by the absorptive action of the aqueous vapor in the earth's atmosphere; D belongs to sodium; b, (a group of lines near E, towards F,) belongs to magnesium. There seems to be some difference of opinion with regard to F; the majority say it belongs to hydrogen; according to Angstrom, it belongs to strontium; G belongs to iron, and H to calcium (lime). According to Mr. Huggins and Dr. Miller, E belongs to iron; whilst, according to the researches of Messrs. Johnson and Allen, published in the thirty-fifth volume of "Silliman's Journal," E belongs to cæsium. These discrepancies will, doubtless, soon be reconciled.

Aluminium is especially characterized by two strong lines lying between the H lines of the solar spectrum, and there corresponding to two dark lines.

The manganese spectrum contains thirteen lines between F and G, corresponding to lines in the solar spectrum.

By comparing simultaneously each spectrum of the elements with the solar spectrum, and observing their coincident lines, the several terrestrial substances have been discovered in the sun.

RIVALRY in trade is shown in the case of two sausage dealers in Paris with shops adjoining, one of whom has painted on his glass window, over a pyramid of sausages, "At 80 centimes a pound — to pay more is to be robbed"; while the other puts his sausages into an obelisk, and paints over it, "At 40 centimes a pound — to pay less is to be poisoned."

"THERE is a tide in the affairs of men which, taken at its flood, leads on to fortune." A man, who has for some months sold a patent medicine, has just in the nick of time turned undertaker.

ROSES.

THE word rose in the English tongue has certainly a pensive and lingering sound, suggestive of the dreamy warmth and light of a long summer day,— one of those summer days in which the queen rose revels and expands into surpassing beauty. It is the sweetest of girls' names, and the loveliest flower that blows is not misapplied when chosen as the name of the loveliest thing in nature,— a beautiful woman. This flower is as near perfection as anything the earth can produce. Its color and its form are alike exquisite, — that deep, rich glow of color from which, in the Western languages, the flower takes its name; and those thickly imbricated petals, closing over one another in graceful curves, and attracting the eye to the circumference, where it finds complete satisfaction in the circular outline, the typical line of beauty, and the emblem of eternity. Dowered, too, with the most delicious of perfumes, varying so as to suit every taste, from the most odorous blush on the Provence rose to the delicate fragrance of the tea-rose. Had it but permanency (which, however, the Fathers intimate that it possessed in Eden), it would be absolutely perfect. The myrtle, which, as an Eastern legend says, Adam brought with him out of Paradise, is the only flower that can compare with it; and even the myrtle lacks the rose's multiplicity of shades of color. Alas, that the worm i' the bud should ever attack the rose (as gardeners know to their cost) before it blooms, and that evanescence, more or less speedy, should be its lot afterwards!

The rose is especially the flower of fairyland, of romance, of poetry. The unfortunate merchant plucked roses for his daughter, Beauty, in the Beast's garden. Bonny Kilmeny, in the Ettrick Shepherd's finest poem, comes back from "the land of vision" with "roses the fairest that ever were seen." Dorothea sent a bunch of roses down from Paradise to her wavering lover. The roses of Sharon in Sacred writ, find their classical counterpart in the rose-gardens of Pæstum, that flowered twice in the year. At present, such changes have passed over Italy, that no roses are found among its picturesque ruins. Summer, to most of us, does not come with the swallows, but when the roses blossom; and even so far back as Horace's time, "the last rose of summer" ("some belated rose of the autumn," as Lord Lytton words it in the last translation of the poet) was regarded as synonymous with the latest gleam of sunshine. Indeed, the rose is the flower which the poets have ever most loved to twine in their garlands. From Anacreon to Tennyson, from Homer to Hafiz, Eastern and Western bards alike rejoice in the rose. Seldom have fonder words been spoken to it than those of Sappho's: — "If Jove had wished to make a queen among flowers, the rose would have worn the crown; it is the pride of plants, the garden's glow; it breathes love, and Venus rests amongst its blooms; its leaves wave in graceful beauty, its petals laugh in the Zephyr;" and much more to the same effect. Milton paints us Eve —

> "Veil'd in a cloud of fragrance, where she stood
> Half spied, so thick the roses blushing round
> About her glow'd."

In the centre of Dante's conception of paradise is an enormous yellow rose, with petals forever expanding and closing again, everlastingly redolent of the praises of the saints. The poet's vision was doubtless colored by those glorious rose-windows of the Continental churches which were contemporaneous with him, and which we still so greatly admire. Aurora scattering roses on the earth, was never more beautifully represented in sculpture than in Thorwaldsen's bas-relief; or, in poetry, than by the Laureate's "awful rose of dawn."

Such are a few of the associations which cluster round the rose. It is indeed to the long summer days what the nightingale is to their nights; so what superlative could heighten the love with which it is universally regarded? Let us descend to more practical points connected with it. It belongs to a great natural order of plants, which is widely disseminated over temperate climes in both the Old and the New World; but no roses are found either in South America or Australia.

The Feast of Roses in Cashmere (as all readers of "Lalla Rookh" remember) was sacred to love and revelry during the period of the flowers' bloom, when their fragrance, and the soft fall of distant fountains, and the bulbul's gush of song, called forth the tenderest feelings of the heart. "You may place a hundred handfuls of fragrant herbs and flowers before the nightingale," says Jami, "yet he wishes not in his constant heart for more than the sweet breath of his beloved rose." In Phrygia, from the earliest days of the worship of Cybele, her devotees strewed roses before her triumphal procession through the land each summer, emblematic of that season's gifts; while at Rome, with a curious anticipation of the offerings at Père la Chaise, the Feast of Roses was celebrated by laying roses on the graves of relatives. They were associated also with revelry, and the votaries of luxury had cushions stuffed with roses, and wore them in chaplets as the Epicurean poet so deliciously indicates, in his Watteau-like picture of Pyrrha wooed "'mongst many a rose."

Numerous as their own tints, are the uses of the rose in proverbial and symbolical language. "No rose without a thorn" commends itself to us at once as a genuine home-born adage, redolent of dewy country lanes. It was the flower of Venus: hence sprung various poetic myths amongst the ancients, which have passed into common use with us, as, that kisses ought to be given under the rose, that Cupid presented a rose to the god of Silence, and so on. These legends are somewhat differently worded amongst the Teutonic races. With the ancient Germans, it is said that roses were carved on the ceilings of their banqueting halls, as a hint that silence was to be observed in the outer world respecting the frank utterances engendered by wine and feasting.

The cultivation of roses is a branch of horticulture which has made enormous strides of late years, owing to the ever-increasing popularity of the flower. It may be called *par excellence* the clergyman's flower, as in most localities it can remain out of doors during the year, and, unlike the fantastic tenants of the squire's ribbon-beds, needs not a whole staff of gardeners to look after its wellfare. According to the poets, Venus, when rushing to assist Adonis as he was attacked by the fatal wild-boar, was herself torn by his tusks; owing to the ruddy drops that fell from the wound, roses, which had formerly been white, assumed their familiar scarlet hues. Even this dainty legend, however, will not account for the multiplicity of colors in which modern roses are decked. The purest white, the richest crimson shading into black, the most golden yellow, together with every conceivable intermediate shade, are all represented in even ordinary rosaries.

Besides their charming aspect and fragrance, the economical uses of roses are neither few nor unimportant. To say nothing of the immense numbers of standard roses yearly disposed of by the nurserymen, the demand for cut roses, of which to make bouquets, or to adorn dinner-tables during the season, is enormous, and annually increasing. But of direct uses the rose can boast more than, perhaps, any other plant of temperate climes, with the exception of the cereals. A grateful conserve is made from the hips, which contain a large percentage of citric and malic acids. Druggists manufacture rose-water by an infusion of the petals. These have also the curious chemical quality of forming a black compound with the salts of iron. Thus the Orientals beat them in an iron mortar with spices, and compose perfumed beads from the paste. Our grandmothers, being notably good housewives, preserved the petals for the making of that delicious *pot-pourri* with which the halls of old-fashioned country residences are still redolent. And thus we arrive at the most valuable commercial product of the rose, the celebrated *attar* or *otto* of roses, which well merits a concluding paragraph of its own.

Two species of rose are mainly used for this delicious perfume, the musk and the damask rose. The natives of India often make it by merely steeping the leaves in spring-water, and carefully skimming the surface. More frequently, however, it is procured by distillation through a hollow bamboo into a vessel which contains sandal-wood oil. The mixture is allowed to stand, and the pure attar (which sells for its weight in silver) is skimmed off in small globules. Umritsir is the head-quarters of the manufacture in India, and the *Rosa centifolia* is the rose there used for the purpose. This only flowers once a year, but ten tons of its petals are annually consumed in the distillation, which are worth from $100 to $150 per ton in the raw state. In Europe, Adrianople is celebrated for its rose-fields, which extend over 12,000 or 14,000 acres, and furnish the greater part of the attar consumed in the Western world. From the latter part of April to the beginning of June is the season for picking the roses, and at sunrise the plains present a beautiful idyllic scene to the eye, looking like a vast garden full of life and fragrance, with hundreds of Bulgarian boys and girls gathering the flowers into baskets and sacks; the air impregnated with the delicious scent, and the spectacle enlivened by song, dance, and music on all sides. It is estimated that the rose districts of Adrianople produced in the season of 1866 about 700,000 miscals of attar of roses (the miscal being 1½ drachm), the price averaging rather more than 75 cents per miscal. If the weather is cool in spring, and there are copious dews and showers, the crops prosper and produce an abundant yield. The season of 1866 was so favorable, that eight okes of petals (less than 23 lbs.) yielded a miscal of oil. If the weather, however, is hot and dry, it takes double that quantity of petals. The culture of the rose does not entail much trouble or expense. Land is cheap and moderately taxed. In a favorable season a donum (forty paces square) will produce 1,000 okes of petals, or 100 miscals of oil, valued at 1,500 piastres. After all outgoings, an average crop will yield about $25 per donum. The attar is bought up for foreign markets, and despatched to Constantinople and Smyrna, to undergo the process of adulteration with sandal-wood and other oils, as it is said that in London the Adrianople attar finds a readier sale when thus adulterated than in its purity.

Sagacity of the Dog. — The following will be found interesting: "A fine Newfoundland dog, which was kept at an inn in Dorsetshire, was accustomed

every morning, as the clock struck eight, to take in his mouth a basket placed for the purpose, and containing a few pence, and to carry it across the street to a baker's, who took out the money, and replaced it by a certain number of rolls. With these Neptune hastened back to the kitchen, and safely deposited his trust; but what was well worthy of remark, he never attempted to take the basket on Sunday mornings."

Every one who has travelled much in Scotland, more especially in the Highland districts, must have remarked the large attendance of shepherds' dogs at church on Sundays. This peculiarity is very interesting to English tourists, one of whom states that he was told that many of the dogs were more regular attendants than their masters. This gentleman mentions that, in one parish, the animals, perhaps demoralized by a "black sheep" among their number, became so quarrelsome and unmannerly in their behavior, that the minister requested all who had been in the habit of bringing their dogs, to confine them to the house before leaving for church. This plan answered exceedingly well for the first Sunday, but, for the future, not a single shepherd or farmer could find his dog on a Sunday morning. They had no notion of being deprived of their accustomed liberty, and, well knowing the hour of service, set off to church without their masters. An attempt was then made to compromise matters, by erecting a large kennel close to the church, where the dogs were imprisoned during public worship, but they kept up such a fearful howling, that the congregation was seriously disturbed, and there was no help for it but to restore them to their former rights and privileges.

Shot as a Medicine. — Dr. Maydieu, of France, has revived the old practice of giving shot for bilious colic. His method is, to take No. 5 shot, after carefully washing them with sweet oil, and give a desert spoonful every half hour. He claims that in five or six hours the vomiting ceases. The Editors of the "Pacific Medical and Surgical Journal" relate the following anecdote, illustrative of this treatment: — A clergyman was taken very sick and stopped at the house of a good old lady, who was familiar with the treatment, who stated that she had no shot, but a bullet which would answer the purpose. She gave it to the divine, who, after being assured of its great efficacy, swallowed it, and to his joy and surprise found that in a very short time he was entirely relieved of the colic. Before leaving, he expressed some doubt to the old lady about the piece of lead so heavy finding its way through the bowels. "Oh, my," she replied, "you need have no anxiety about that, as it has been through me ten or twelve times."

A Novel Method of Practice. — We clip the following from the *Boston Courier:*

"A good, but we know not how reliable a story, is related of a venerable doctor of the experimental school of medicine. It was one of his rules never to have anything wasted; and, therefore, when any prescription remained after the patient had died or recovered, he would empty it into a bottle kept for the purpose, that became the receptacle of a heterogeneous compound that science could not analyze. A younger member of the faculty noted this as a very singular fact, and asked him the reason for it. The doctor hesitated a little, and then replied that, though in ordinary cases he knew well what to do, there were instances when all his medical skill failed. At such times it was his custom to resort to the big bottle, and leave nature and accident to accomplish the cure. 'And, will you believe it,' said he 'some of my most brilliant successes have resulted from it!"

"I suppose," said a quack, while feeling the pulse of a patient who reluctantly submitted to solicit his advice, "I suppose you think me a bit of a humbug?" "Sir," gravely replied the sick man, "I was not aware until now that you could so readily discover a man's thoughts by feeling his pulse.'"

LIFE.

Life is not always sunshine,
  It sometimes breaks in storm,
Though ever on the tempest
  Bright gleams the rainbow's form.

Dear ones that have been cherished
  Oft leave us on the way,
And shadows deep and lonesome
  Close o'er the changeful day.

We oft must carry sorrows
  The world can never know,
And hide the wound that wringeth
  The heart with secret woe.

Yet as the years fly o'er us,
  And we journey on below,
The skies shine brightly o'er us,
  And the flowers still sweetly grow.

Our path is often lovelit,
  And friendships cheer the way,
And oft our Father turneth
  The shadows into day.

Fierce tempests often hasten
  The voyager to peace,
And bitterest trials chasten
  The soul for deepest bliss.

CHAS. NAISMITH.

Boston.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Fourth Paper.

THE surest means of preserving health, and one over which we have full control, is by a properly regulated diet. What to eat, when to eat, and how to eat, are the three great questions upon which depend the health and happiness of the individual, and, to a large extent, the physical, intellectual, and moral strength of a community or nation.

Digestion.

Of the nutritive processes, digestion is the most important, as through it we receive food, and prepare it for appropriation by the various tissues of the body. It includes several processes, all tending to one object, viz., the reduction of food to a homogeneous fluid, the chyle, capable of absorption by the lacteals in the intestines, and fit to be poured into the circulation near the heart, for the maintenance of the blood in a healthy condition. These processes are: the prehension of the food by the lips and tongue, its mechanical division by the teeth, its mixture with the saliva, its conveyance to the stomach, its solution there by the gastric juice, the separation of the nutritious principles by the lacteals, and the final rejection from the body of the indigestible portions.

The alimentary canal, in which these processes are carried on, is lined by mucous membrane, continuous with the skin, which it resembles in its essential characters; many glands send their ducts to open upon it, of which the principal are the liver, the pancreas, the mucous and the salivary glands; it is freely supplied with vessels and nerves, and is, therefore, as most persons know to their sorrow, very liable to painful congestions and inflammations.

Of the prehension of the food in man, little need be said, as the muscular actions of the lips, tongue, and cheeks, are familiar to all; few, however, are aware of the number of muscles brought into harmonious action in the mouth, or of the exquisite sense of touch resident in these organs. The tongue presses the savory food against the hard palate above, and the cheeks keep it within the arches of the teeth.

Mastication.

It is a common, but a true saying, that "food well-chewed is half-digested." Mastication prepares the food for solution in the stomach, just as mechanical division out of the body renders substances more easily soluble. The whole digestive process is deranged, if we neglect the mastication of our food; this neglect is the most frequent cause of dyspepsia. There is no habit so destructive to the digestive powers, as our, we might almost say, "national" habit of swallowing our food without chewing it, like so many anacondas. Go into the common restaurants in our large cities, where business men snatch a few moments from their toil for money, to cram their stomachs with half-chewed meat and bolted veg-

etables, pies, whose contents are dyspepsias, and puddings, whose elements are the pains of indigestion, flavored by tobacco, and perhaps by alcoholic stimulus, — there you will see the animals fed at any hour from twelve to four, continually thronging around the tables at which they remain from ten to twenty minutes, not having time even to take off their hats, and literally shovelling in their food with their knives faster than the mouth can comfortably dispose of it. At such times we are prepared to exclaim, with Henry Ward Beecher, "The mouth is but a mill. Therein goes perpetual grists for grinding." The eye and the ear have a certain nobleness, dealing as they do with the light of heaven and the music in the air; "but the mouth is a strange aperture, into which men cast untold substance, and it hath never yet been filled. Nor do I believe that any man can quietly watch the steps of eating, grinding, and swallowing, as a mere animal act, unclothed by associations, without feeling even more disgust than he would at a pig's banquet from the noisy trough."

If we do not chew our food, we lose the benefit of its mixture with the saliva, which begins the process of digestion in the mouth, acting on the starchy particles and facilitating their conversion into sugar, which the stomach cannot do. The size and number of the salivary glands indicate the importance of their secretion; the principal ones are the parotid glands, in front of the ear, so often enlarged in mumps, opening into the mouth near the middle of the cheeks; others are situated under the tongue and lower jaw, their ducts opening also into the mouth. The saliva is a transparent, slightly viscid fluid, usually alkaline in character; the quantity supplied in a day for digestive purposes is nearly three pints; under the influence of tobacco and certain medicines, the amount is largely increased, and its properties considerably changed. At meal-times it is poured out abundantly, especially if the food is of a savory quality; it is well known that even the idea of food to a hungry person will "make his mouth water," or, in other words, increase the quantity of saliva poured out. It is greatly influenced by mental emotions, and is very nearly suppressed under great fear or anxiety. In animals it sometimes becomes exceedingly acrid and poisonous, as in hydrophobia, its introduction into the blood being as surely, though not so speedily, nor in the same way, fatal as the venom of poisonous serpents.

Swallowing.

The next step is the act of swallowing, in which the food, collected in the hollow of the tongue, and pressed against the palate above, is pushed backward toward the throat, which dilates to receive it; the sentinel epiglottis shuts down over the opening of the windpipe, and the soft palate closes the communication with the nose above; the contractions of the muscles then force the mass into the tube leading to the stomach. These consecutive processes occupy hardly more than a second of time. The first part of the process is under the control of the will; but when the food has passed the back part of the throat, it cannot be recalled except by the act of vomiting. Here we see again the advantage of chewing our food; by the delay and comminution in the mouth, the acute senses therein lodged warn us, if we give them the opportunity, of any injurious substance we may have eaten, in time to allow us to reject it before it passes beyond the control of the will. As the nose is the antechamber of the lungs, giving these delicate organs notice of deleterious properties in the air, so the mouth is the ante-chamber of the stomach, receiving all articles of food, and accepting or rejecting them according to the examination therein made.

The œsophagus or gullet, the membranous and muscular tube leading to the stomach, is widest above, but large enough in all its extent to receive a mass of considerable size, as every glutton knows. Its muscular coat contracts involuntarily in an undulating manner, as may be well seen in

the horse when drinking, or in the ox when swallowing the well-chewed cud. In gallinaceous birds, a portion of this tube is dilated into a "crop," in which the food remains for a time, undergoing a softening and partial digestion, analogous to the insalivation in man; the first three cavities of the compound stomach of ruminating animals may be considered as dilatations of the gullet, or "crops," the fourth stomach, or "rennet bag," being the true digestive cavity, corresponding to the single stomach of man and omnivorous animals.

The tube opens into the stomach, below the diaphragm or midriff, the entrance being guarded by a circular muscle which allows the contents to pass in either direction; in vomiting the muscular action of the tube is reversed, and in ruminating animals this inverted action is under the influence of the will.

The Stomach.

The stomach is an elongated pouch, curved, dilatable, and contractile, situated principally on the left side of the body, extending somewhat obliquely toward the middle line; in the female, from the effect of tight-lacing, the organ is much distorted, and is situated in any place not occupied by the compressed liver and spleen. The adult stomach, when moderately distended, will hold about three pints; though many persons, especially the drinkers of lager beer, put far more than this into it. The stomach of the new-born babe cannot contain more than a tablespoonful; yet how often do we see ignorant nurses pouring spoonful after spoonful into the infant's mouth, and should it cry from the pain of distension, patting and trotting it, and pouring down more, in order, as they say, to "drive the wind out"? Thus we distend this organ beyond its natural capacity, "from the cradle to the grave," interfering with digestion, and laying the foundation for diseases of the stomach, and indirectly of the whole system. It may be said without exaggeration, that one-half of Christendom unconsciously, but actually, commit suicide in this way.

The muscles are not regularly circular, nor longitudinal, but cross each other in various directions, an arrangement of great importance to the digestive function; the lining membrane, though delicate, is thick and loose to accommodate it to the variously distended states of the organ; it is freely supplied with blood from the first and largest branch of the abdominal aorta, the vessels being very tortuous, so as to secure an ample supply during all changes of volume; the nerves are large and numerous, explaining the intimate sympathy between the stomach and other organs.

During digestion both openings of the stomach, the cardiac at the œsophageal end, and the pyloric at the commencement of the intestine, are closed for a time proportioned to the stimulus of the contents; a beautiful provision by which the healthy organ keeps the food within itself till it is digested, not allowing undigested matter to pass out unless its muscular powers have been exhausted by abuse.

A remarkable opportunity of ascertaining the condition of the stomach during digestion, presented itself about forty-five years ago in the person of a young man, the anterior parts of whose stomach were accidentally shot away; the wound healed, leaving a fistulous opening through which the phenomena of digestion were studied for several years by Dr. Beaumont and others; from their numerous experiments a great number of important facts were obtained, and many errors corrected. The color of the healthy internal surface was found to be a light pink; soft and velvety in appearance, with a covering of a thin transparent mucus; on the entrance of food, innumerable points protruded from the membrane, from which distilled a colorless, slightly viscid, acid fluid, the gastric juice.

The gastric juice is not accumulated in the stomach while fasting, and is very seldom excreted unless on the application of food or other excitants. It is poured out in the proportion necessary for the solution of the food required by the system; if more than this amount is eaten, this fluid is not

increased in quantity, and the excess of food remains in the stomach undigested, or passes in a crude state into the intestines, becoming a source of nervous irritation, pain, and disease for a long time. This fact is of the highest importance in the preservation of health, as over-eating not only injures by its excess, but prevents the proper digestion of what the system actually requires. High livers surely weaken their digestive system; even though they experience at the time only a slight fulness and oppression, the injury is done, though not felt, because we are unconscious of the existence or of the condition of the stomach, unless it is seriously diseased. When we are conscious of the existence of a brain, or lungs, or heart, or stomach, or intestines, or other organs, we may be sure that something is going wrong in them; and we had better heed the warning in time.

After excessive or improper eating, the surface of the stomach becomes red and dry, the secretion is vitiated or suppressed, and irregular patches of inflammation, resembling eruptions on the skin, and ulcerations, appear, extending up to the mouth in the form of canker, etc.; the membrane is congested, the fluids are acrid, and the bile flows into the stomach; these morbid conditions are accompanied by corresponding appearances in the tongue, which thus becomes an important guide in ascertaining the state of the digestive apparatus; on the repetition of the cause, the coats of the stomach become disorganized by degrees, and the worst and least curable form of dyspepsia comes on.

It is very common in these days to drink iced-water and swallow ice-cream in warm weather, and on festive occasions; the immediate effect of this is to drive the blood from the walls of the stomach, which on reaction comes back in increased quantity, just as it would on the surface of the skin, causing an increased flow of gastric fluid; the turgidity of the vessels is accompanied by an increase of heat, and thus, though we feel cooled and refreshed at first, we feel hotter and more uncomfortable soon after, unless by repeated draughts we paralyze the nerves of the stomach. A difference of sixty-seven degrees of temperature between the cold fluid and the warm stomach cannot long be borne with impunity by this delicate organ.

On entering the stomach the food is subjected to a peculiar wavy motion, which thoroughly intermixes the gastric fluid, and aids its solution by gentle pressure; in this way the contents revolve about the interior of the stomach from one end to the other, without any of the crushing mechanical action supposed to be necessary by the physiologists of the last century; the grinding action of the gizzard of the grain-eating birds is mastication rather than digestion; the latter being always effected by the action of a solvent fluid. In addition, the stomach is continually agitated by the muscles of respiration; and all these movements are somewhat dependent on the nervous system, being retarded by any strong exciting or depressing emotion. At table while we feel that mental depression interferes with appetite and digestion, pleasurable emotions are favorable to the process; a merry laugh and cheerful appreciation of a joke, by shaking the sides and increasing the activity of the circulation, favor the secretion of the gastric fluid, and give firmness and regularity to the movements of the stomach. "Laugh and grow fat" is a familiar saying, and, like most popular expressions of the kind, has a foundation in physiology.

We have spoken above of the mere animal part of eating, quoting the words of Henry Ward Beecher; there is the opposite view of the subject, on which the same writer speaks as follows: "If there is one word that is universally significant of love, peace, refinement, social amenity, friendship, pure society, joy, it is the *table*. Such power hath the heart to clothe the most unseeming things with its own sweet vines and fragrant flowers, that we have not only forgotten that eating is an animal act, but we have come to associate everything that is sweet and beautiful with it. We no longer think

of appetite, but of love. It is not food, but society that we have. We cover the merest animal necessities with such sympathies, tastes, joys, conversations, and gayeties, that the table, the symbol of appetite, has cleared itself from all grossness, and stands, in the language of the world, as the centre of social joy. A feast becomes sacred to hospitality; a festival a religious observance."

How different is this from the gormandizing scene before represented, and how well calculated to promote a natural digestion, the synonym of good blood and sound health!

THE VALUE OF GELATIN AS FOOD.

THE general appreciation of articles of food more or less exclusively gelatinous, such as isinglass, jellies, cod sounds, calves' feet, cow-heel, calf's head, etc., was a few years since denounced by some persons as an error; and, in opposition to the general experience and common sense of mankind, they maintained that gelatin and gelatinous articles of food were of no value whatever, and that the benefit of, say, half a pint of strong calf's-foot jelly solely depended on the tablespoonful of wine which it did or did not contain.

The grounds on which this extraordinary opinion was based were chiefly twofold: firstly, that gelatin is not found in the blood; and, secondly, that an animal fed on nothing else than gelatin speedily dies of starvation. The absence of gelatin from the blood does not prove that it is not nutritious. Milk is the model food, the only substance expressly created for the nourishment of animals, and which has no other use in the economy of nature. Now the albuminoid, or flesh-forming substance, in milk, is the curdy matter, or casein; no one can deny its value, except, perhaps, the persons who say that gelatin is not nutritious; for casein, like gelatin, is never found in the blood. If we turn to the latest, and certainly the most exhaustive, treatise on physiology which has been recently published, namely, that of Marshall, we shall find that the value of gelatin is thus stated: — "Gelatin is not found in the blood itself, but when digested is converted into a gelatine-peptone, and so becomes absorbed as we have seen, but in what state is not yet known. Nor is its destination in the nutritive processes of the body certain. Either it may serve for the direct nutrition of the gelatine-yielding tissues, or, — and this is very probable, — it may by itself, undergoing oxidation, conserve other more important tissues, and at the same time maintain the temperature of the body. Its efficacy, as administered in jellies, etc., in cases of sickness, especially indicates its inportance as an article of diet."

Dr. Edward Smith, F. R. S., in the fourth edition of his valuable "Practical Dietary," states that gelatin "exists very largely in the skin, horns, hoofs, tendons, and bones of animals, and in a less amount in the flesh. Hence we obtain it from calves' feet and cow-heel when boiled for that purpose, from the shin and other parts of beef when prepared for soup, and from bones which have been broken and boiled for many hours in water. Whether, therefore, as jelly or in soup, this substance is largely eaten; and yet it is affirmed even to this day that it is innutritious, and therefore worthless as food. My own experiments have proved that gelatin, like albumen, is transformed within the system, and leaves the body as urea, and hence it must have played its part in nutrition; but whether its nutritive value is quite equal to that of albumen, is another question. I believe gelatin to be a valuable food, and every one knows that, with the addition of other subsubstances, it is a very agreeable one. It is, however, very probable that it is not an economical food as it is ordinarily prepared, but it may be cheaply obtained in soup from bones."

I now come to the second so-called

argument by which the uselessness of gelatin is attempted to be maintained. It is said that an animal fed on gelatin dies rapidly of starvation and inanition. This is perfectly true; but the fact is, that no simple substance given alone will support life. The most nutritive materials, such as albumen, fibrin, gluten, — to say nothing of such substances as starch or sugar, — all equally fail to support life when given alone. Good wheaten bread will support life any length of time; but separate the starch, gluten, and other constituents, and give them singly, and, if the argument above adduced holds good, you could prove each of these substances to be totally without value as food, as neither will support life when used alone.

I believe that this false opinion respecting the valueless character of gelatin, arose from some experiments on the feeding of convicts in some of the French prisons. They were supplied with a very small quantity of gelatin in place of other articles of food, and soon showed symptoms of starvation. The fact that dogs, though they die rapidly when fed on perfectly pure gelatin, will live any length of time if kept on soft bones, which consist almost exclusively of gelatin and bone earth, is a convincing proof that the gelatin is a valuable article of diet.

Although I believe that no amount of preaching on the part of dabblers in physiology, would controvert the practical experience of mankind, and abolish the use of mock turtle, jellies, and other gelatinous articles of diet, I am anxious to show that these absurd views are not held by the highest authorities, and that the value of gelatin, although it may be denied by some, is fully maintained by our best scientific writers.

W. B. Tegetmeier, in "Food Journal."

LEPROSY OF THE BIBLE, AND ITS PRESENT EXISTENCE IN NORTH AMERICA

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

Second Paper.

MY readers have now had a hasty sketch of leoprosy, from which they see that it is a disease spread over the length and breadth of the world, from the Icelander living *in* fur and *on* fat, to the native of the tropics living in *puris naturalibus*, and on sago, or rice, or bread-fruit. It spares neither sex, or rank, or condition. Its development is not restricted to any period of life. It appears to occur most frequently about puberty, and from that period of life to maturity; but it has been observed from infancy or early childhood to fifty years of age and upwards. Taking all reports together, it seems to attack the two sexes nearly equally. The English Commission concluded that in hot climates, the disease appears to be much more frequent among the dark than among the white population. Most of the cases of the latter are said to occur in persons born in the country, or in those who have long resided in districts where the disease is endemic. In Southern Africa the greatest sufferers are stated to be the Hottentots, next the negroes, and lastly the white natives. In Egypt the Bedouins are said to be exempt; in the Mediterranean Archipelago, the poor Greek population appears to be much more frequently affected than the Mohammedans. In India, all the native races appear to be liable to the disease. The European residents are very seldom attacked, the Eurasians more frequently. Whether, and to what extent, the members of the Jewish nation are more liable to the disease than other similarly conditioned races, are points not yet decided.

Although the great majority of cases of leprous disease in all countries occur among the lowest and poorest of the people, yet the better conditioned classes are, however, far from being exempt,

their liability appearing to vary a good deal in different countries.

All observers agree that an unwholesome and insufficient diet, exposure to atmospheric vicissitudes without sufficient clothing, residence in foul, damp dwellings, and the neglect of personal cleanliness, serve to aggravate the disease, and to accelerate its progress; and, on the other hand, that it is greatly retarded and mitigated by more favorable conditions in these several respects.

With these conclusions I agree. They express, in other words, that all which reduces man's condition from what we know to be a healthy one, renders him more liable to leprosy in those countries in which it is endemic. As to the use of certain articles of food, such as fish, *et cetera*, causing leprosy, I would remark that it is most natural for medical observers to attribute a peculiar, or exclusive, or bad or scanty diet, as a producing or predisposing cause. It must, however, be remembered that the Icelander living on oil, the Norwegian on fish, the mountaineers of Lebanon, the inhabitants of the Highlands in the north of Persia and in Hindostan living on neither, the Chinaman on rice, the tropic native living on sago or bread-fruit, are all affected by leprosy. Therefore, bad food, exclusive diet, or unsuitable mixture, must be considered as simply causes preventing man from being in such a condition of health as to resist the poison of leprosy, whatever that poison may be.

From a study of the various reports of all observers, I would here distinctly say that leprosy is *hereditary*, but that it occurs in persons in whom no hereditary tendency can be traced. Sometimes only one member of the family will be affected. Sometimes the child wtll not have the same form as the parent, one exhibiting the tubercula, and the other the anæsthetic phase of the disease. It will skip a generation to appear in the next. It is a disease by itself, quite independent of any other, and of course does not preclude the coexistence of any other. There are but few diseases which resemble it in any way.

Leprosy is not contagious. This is my firm belief, and I could wish it might be most generally concurred in, as it would contribute greatly to an amelioration of the condition and surroundings of this most unhappy portion of the world's population. To show cause for my belief, I will quote those most accurate observers, Drs. Daniellssen and Bœck, who say, "As the result of our observations, we have only to deny the contagiousness of leprosy. Among the hundreds of lepers whom we have seen daily, not a single instance has occurred of the disease spreading by contagion. We know many married persons, one of whom is leprous, living together for years without the other becoming affected. At St. George's hospital (in Bergen, Norway) many of the attendants on the inmates have lived there for more than thirty years, and are quite free from any trace of the disease."

The English Commission also reports, that the all but unanimous conviction of the most experienced observers in different parts of the world is quite opposed to the belief that leprosy is contagious or communicable by proximity, or contact with the diseased. The evidence derived from the experience of the attendants in leper asylums, is especially conclusive upon this point. The few instances that have been reported in a contrary sense, either rest on imperfect observation, or they are recorded with so little attention to the necessary details, as not to affect the above conclusion.

If I except Norway, I think it is true that nowhere in the world where leprosy exists is there proper public provision for the leprous poor. This is fearfully true of India, even under British rule. In many parts of the world, compulsory seclusion has been adopted, with, of course, no benefit to the leper or to society, as the disease is hereditary, and those with the seeds of it in their constitution go about without detection. Can now nothing be done to check or cure this fearful malady? Truth lies in the conclusion of the British Report that there is an unanimous accord of opinion that the

greatest benefit is derived from the adoption of hygienic measures; and that by improving the general conditions, physical and moral, of the leprous poor, very much may be done to retard or arrest the malady in its early stages, and also to mitigate its severity when more fully developed. Medicinal treatment is universally admitted to be of no avail unless combined with the regular use of a nutritive, unstimulating diet, suitable clothing, protection against the vicissitudes of weather, personal cleanliness, and exercise in the open air. There is certainly no medicinal substance, vegetable or mineral, which exerts anything like a direct or specific effect on the malady.

I of course forbear here any description of the various remedies used from time to time, as also the special treatment now in vogue.

Does leprosy exist in North America? Yes, in one spot not very far from us a focus has been started. It is not within the dominion of the United States. A French emigrant family from St. Malo, in Normandy, who were afflicted with the disease, came to Tracadie, a district in the county of Gloucester, bordering the bay of Chaleurs in the Gulf of the St. Lawrence. This was about 1815. The descendants of this family have increased in number, and being, unfortunately, in the poorest circumstances, leprosy has showed itself amongst them to a very considerable extent. The disease is only known in New Brunswick, in three parishes in the county of Gloucester, and one in the county of Northumberland. The districts where the leprosy exists, viz., Tracadie, Pokemoche, and Niquac, comprehend a circle of 25 miles in diameter. The population was about 3,978 in 1860.

By the year 1844, leprosy in the descendants of the above mentioned family had so increased, as to induce the Government to interfere by calling within its care and jurisdiction the unfortunate victims. A hospital was first established in July, 1844, at Sheldrake Island, in the Miramichi River. Commissioners were appointed to separate the lepers from the rest of the community, and confine them within the limits of the establishment. This measure excited the dread and horror of the poor victims, and several fled to the forest and secreted themselves, to avoid what was considered imprisonment for life. Prior to the establishment of the lazaretto, leprous persons communicated freely with the rest of the community. This lazaretto was continued at Sheldrake Island till July, 1849. During this period there were admitted 32 patients, of whom 14 died, 3 escaped from the island, and 15 were transferred to the new hospital at Tracadie, opened in July, 1849. From that period down to October 1st, 1863, 82 patients, including the above 15, have been received; of these 58 have died, 3 were discharged as not diseased, and 21 remained in the hospital. The Government Inspector's Report for that year, gives anything but a favorable report of the attractiveness of the establishment and its locality; still it probably provides more physical comfort than its wretched inmates would be able to secure outside. An entirely different policy is now pursued in reference to the lepers, as will be seen from extracts from letters to me by my friend Dr. A. C. Smith, who was in charge of the Tracadie Leper Hospital in 1865, when the number of patients were 21, 15 males and 6 females. The annual number of deaths, 1 to 11. An ambrotype Dr. Smith kindly sent me, shows a group of his unfortunate patients, the sight of which is quite enough to excite the sympathy of us all. Dr. Smith adds, "The principal object of our lazaretto is to furnish a home for the poor unfortunates. Even if their relatives could support them, they would not do so. Our lepers have been offered their liberty, but would prefer to remain where they are, than to go out into the world to starve. Our lazaretto is now an *asylum*. The lepers are not now *imprisoned*, as they used to be. The leprosy, as it exists here, is confined to the very poorest French. I informed the Government in my last report, that, as the condition of the country improved, and a better diet

was substituted for the present miserable fare, the disease would eventually disappear from our shores."

I have said that leprosy was still very prevalent in Norway, from whence, as is known, large numbers of immigrants come, and settle in our Western States. They have, of course, brought leprosy with them, enough to excite the attention and study of their own physicians. It is with a sense of relief that I am able to give some reliable information in reference to the future of the disease in the United States, so far as respects these settlers. Dr. Holmboe, Surgeon to the General Hospital at Bergen, in Norway, made, in 1863, a tour of Illinois, Iowa, Minnesota, and Wisconsin, in which States the Norwegian emigrants principally settle. On investigating the leprosy prevalent among them, he came to the following interesting conclusions, which may be found published in the British and Foreign Medico-Chir. Review, Jan., 1870.

"There are, amongst the Norsk population in North America, no instances of leprosy attacking those born in the country. There are, amongst the Norwegians who have immigrated, taken altogether, not a few who are now the subjects of leprosy. Most of the leprosy patients were already leprosic when they came over. In not a few cases the leprosic symptoms have had their first outbreak in America. This has happened, however, to those who were adults at the date of their immigration, who had, before coming over, lived in such a manner as to predispose to the disease, and who had not profited to the same extent as most, in the general advantages life in America offers."

"Leprosy when imported into America, has, as a rule, a longer and milder course than in Norway, and shows also a stronger tendency to spontaneous improvement and recovery. Life in America will, in general, avert the outbreak of leprosy, so that many will there remain wholly free, who, according to all estimate of probabilities, would have suffered, had they remained in Norway. Climate has certainly a great share in effecting this change. It is not nearly so rigorous and inclement in America as in Norway, and thus does not make the same demands on the vital powers of resistance. It is probable, however, that the altered mode of life has quite as large a share as climate. The immigrants are, in a general way, far better off than they were in Norway, and others are not under the necessity of exposing themselves so much to the influence of climate, whilst, when the need for exposure occurs, they are much better protected. Leprosy will disappear amongst the Norwegian population in the States, or will be found only in isolated imported cases. It will not be transmitted from generation to generation as an epidemic disease."

From such a valued observer, these conclusions are very important. I trust they may be substantiated by Prof. Bœck, whose name I have repeatedly mentioned. He is now on a visit to the Norwegian colony in Minnesota, to observe the influence of changed life and climate on the leprosy so prevalent in his own, and those settlers' country. Whether leprosy is ever an endemic disease in the United States, I am not yet certain of, as the evidence in my possession is not, for me, conclusive. The large number of Chinese coming to this country, of course, bring with them the leprosy so prevalent in China, but we now know that the disease is not contagious, and that change of life and climate will gradually eradicate it, as it is undoubtedly doing amongst the Norwegian colonists.

TEACHERS, above all things, says ex-President Hill of Harvard College, should have regard for the physical capacities of children. No machinery is so delicate in its structure, or is called on to produce work so fine, as the brains of school children. Their capacities of endurance are very limited at the age when the faculties are developing. There is more danger to be apprehended from long continuance in study than from close application for a brief period. In this particular the half is better than the whole.

GYMNASTICS.

II.

IT has been suggested that to exercise the lungs, that is to say to train them, the playing upon wind instruments might be usefully employed. Now, the playing upon such instruments as the flute and flageolet requires, comparatively speaking, little effort compared with that necessary in playing the more powerful brass instruments; and, provided the former be not used in excess, would have, to say the least of it, no prejudicial effect on the lungs. This is not so with the others of which we have spoken. Only the other day a bandsman came before us, pale and wasted. One would have supposed to look at him that he was consumptive. On examining his chest however, it was soon found that it was not his lungs, but his heart which was affected. He was suffering from one of the worst forms of heart disease, such as is generally induced by too great a strain on the organs of circulation, and which in his case led to speedy death. In this instance there could be absolutely no other cause traced than the nature of his employment.

The reason why one set of instruments might be used in the way hinted at, and not another, may be readily explained. The essential part of the exercise in blowing wind instruments, consists in a sudden and complete dilatation of the lungs with air, and its subsequent ejection, more or less forcibly, and more or less gradually, the lung acting like the bag in the bagpipe. The complete distention of the lung is, as a rule, a good thing; but when great force is employed to empty it, when the escape of the air is resisted in any way, the proper and equable flow of the blood through the body, and especially through the lung, is prevented. Hence it is, that in players on large brass instruments, the face is congested and red during their exertions; hence also results the injury to the heart, with sometimes, it may be added, destruction of certain portions of the lung. Thus, to exercise the lungs aright we should aim at their full distention, but at the same time at a free expulsion of the respired air; and there is no better method of insuring this than exercise on foot, walking or running as the case may be.

To one entering a modern gymnasium for the first time, the scene irresistibly appeals to his imagination as a representation of some place of torture. The spars, the ropes, and the restless figures swinging to and fro, give the place a character quite peculiar to itself. Now, the exercises employed as a means of training in these establishments are mostly of two kinds; in the one, the body is the fixed point; in the other, it is the movable portion of the apparatus. Certain also of the exercises are intended to develop the upper limbs, certain others the lower; but the former are the more numerous and important. It is further to be remarked that a great many of our sports and pastimes tend to develop one side or portion of the body more than another; a thing which should if possible, be avoided, equable development being most desirable. Thus foot-ball favors the growth of the lower limbs; cricket, the lower limbs and right arm; rowing, the lower limbs, loins, and arms; racquets, tennis, etc., chiefly the lower limbs; fencing, the lower limbs and right arm; walking, running, leaping, etc., the lower limbs principally. To counteract the influence of these, or perhaps more exactly to correct it, is the function of the teacher of gymnastics; and it is for this reason, perhaps, that most gymnastic exercises tell largely on the arms.

We have already pointed out that movement is the great thing in all these exercises. To overcome resistance, as well as to secure motion, no doubt, implies the expenditure of more force; but mere movement in many cases, a gain real and decided. Athletes will boast of the size of their biceps (the large muscle which stands prominently out when the arm is bent

at the elbow so as to bring the fist to the shoulder), and of the weight of the dumb-bells they can use; but the wise man will think less of these things than of the fact that his muscles are getting that exercise which is essential to their well-being, and to his healthy condition. What we chiefly insist on is, that motion is of more importance than is violent exercise, and hence that light apparatus may be quite as efficacious as heavier implements.

There are two systems of gymnastics in use; the heavy, which includes the use of all the apparatus pertaining to a complete gymnasium; and the light, known as the "Dio Lewis System," or "Musical Gymnastics." Both of these systems have merits peculiarly their own, while in some respects the one may be regarded as the complement of the other.

In training for any particular purpose, for example, the attainment of great strength, the heavy is of the first importance; and where practicable, should find a place in connection with every college, in every city, town, and community. The light is invaluable however, as a preparation to the heavy, and as a system which is most admirably adapted to the use of woman, and the youth of both sexes; which the strong, the weak, the old as well as the young, can practice with amusement, pleasure and profit.

"Coupled with the influence of music it is more elevating, ennobling, refining, producing cheerfulness, and taking away fatigue." "In relation to health, strength, and general bearing, light gymnastics are better than any other means of exercise." "A ready use of all the muscles, ease, grace, self-possession, a proper walk and carriage of the body, are no small accomplishments," and these may be easily and readily acquired by a judicious practice in the use of this system. "They develop the chest, strengthen the lungs, and improve the voice; they strengthen the muscles that support the spine, correct constipation, help digestion, warm the extremities, give tone to the muscles about the hips, and vigor to the whole being."

A work and a series of apparatus has been issued by Dio Lewis, which will be found useful in the physical training of boys, girls, or invalids. The apparatus is contained in a small box, and consists of a pair of light wooden dumb-bells, a pair of very light Indian clubs, a long wooden rod, and a pair of wooden rings, — the last for combined exercises.

For exercising certain definite groups of muscles, having a particular object of training in view, and under the direction of a surgeon, a gymnasium with fixed apparatus will be found almost indispensable. But for ordinary purposes nothing more is wanted than what we have mentioned, light dumb-bells, light Indian clubs, and a rod; and, indeed, it may be said that the motion of the body itself, without any extra artificial resistance like that afforded by dumb-bells, Indian clubs, and such like, is quite sufficient for the purposes of physical education.

There is always a tendency for the right side to attain a superiority over the left. Even in chickens this is so; for the liver wing, — that is, the right one — is supposed to be preferable to the other, the left one. It is advisable in certain respects to counteract this tendency. Hence exercises in physical education should take cognizance of one side as well as of the other. There are, however, certain cases where this should not be so; but these come more under the notice of the medical man. They are cases of deformity or partial paralysis.

Many kinds of mal-development are best treated by gymnastics. Take, for instance, what is called the *pigeon breast*. In this the breast-bone of the individual projects far forward and forms a ridge like that of a fowl; his ribs are flattened and too straight, running almost directly backwards. The chest, which contains the lungs and heart, is, therefore, too narrow from side to side, too wide from back to front; but the latter does not compensate for the former. Such individuals are always unhealthy. They are liable to coughs and colds, and very frequently consumptive. Had they when

young, before the bones were too firmly set and knit together, been put through a regular series of exercises which would tend to expand the chest, this would have been avoided, and the individuals might have been strong and healthy. In no case is it too late to do something, provided only the exercises be judicious; for this, after all, is the main point. They should be regularly graduated, becoming more and more severe till something of the desired result has been attained.

Others, again, suffer from a peculiarity the very reverse of that just alluded to; their breast-bones, instead of projecting or bulging, retreat and form a hollow at their lower portions. This condition is frequently observed in shoe-makers who have taken to their trade early in life, and whose health has not been satisfactory. Many of these operatives work with the boot or shoe constantly pressing on the lower part of the breast-bone, so that if the bone is soft, as it is in certain forms of disease, or indeed we might say, as it is in all unhealthy conditions early in life, a permanent indentation is the result. In such conditions also, gymnastics is the appropriate remedy.

Nor does the application of exercise to medicine cease here. Ling, an enthusiastic Swede, conceived that gymnastics might be much more widely used than they even now are in the treatment of diseased conditions, especially of deformities. He was, in course of time, able to institute a building devoted to this purpose, and even now this and many others on the Continent are engaged in the work of healing.

There is no deformity more painful to the sufferer or to the beholder than a crooked spine. But of this there are two kinds. In one, the bones are thrust abruptly backwards, so as to form a projecting angle; and, as this generally depends on disease of the bone, little is to be done for it. In the other, the spine is curved, but not angular, and the curve is to one side, not backwards. One shoulder is higher than the other, and the sufferer has what is called a hunch-back. This may also to some extent depend on diseased bone, but it is certainly favored by weak muscles. Exercise, therefore, which will tend at once to straighten the spine and to strengthen its supporting muscles, should be encouraged; that is to say, if there is nothing to what is called contra-indicate its employment. Thus, were the bones in a state of actual and active disease, rest should be urged; but if there is nothing more than a mere softness of their texture, exercise is the best remedial measure possible. It has been too much the practice to bolster up such unfortunates in iron cases of all kinds, what are called spinal supports among the number, and in certain conditions these are, no doubt, requisite; but we strongly insist on the fact that in particular instances they are as injurious as would be exercise in others.

Let us take another illustration. Painters, who have much to do with white lead, are extremely liable, after a time, to what is called lead-poisoning. The lead by degrees gets into their system, and gradually their health deteriorates. They become subject to colicky pains, their bowels are confined, and finally, if they have not taken warning, they have "dropped wrist." The dropped wrist depends on a partial paralysis, a palsy which affects certain muscles, and certain muscles only. The patient may be unable to lift up his hand, so that the back of it shall be turned upwards; yet he may have perfect power to close his fist, and to grasp anybody with nearly his usual force. In short, the extensor muscles of his hand are paralyzed. The same thing, or something similar to it, may occur to other muscles without evidence of any kind of poisoning, so that we may consider the two kinds of paralysis together, putting aside for a moment the treatment that should be adopted to expel the lead from the system.

As a rule, wherever there is partial paralysis, exercise is the thing to do good. But how, it will be said, is it possible to exercise a paralyzed muscle, one over which you have no con-

trol, no power to make it do as you like? So it may be; still exercise is what is wanted, and it is obtained by means of electricity or galvanism. A galvanic battery or a magneto-electric machine, which you turn with your hand, is employed. The patient's affected hand grasps one of the holders, or, as they are technically called, poles of the battery. The physician applies the other to the affected muscles. If these be very bad, there may be no response to the applied agency, but generally contraction is prompt, and not unfrequently painful. The process is repeated again and again. In other words, the muscle is exercised. Its contraction implies waste, change in its textures, renewal, and growth. The only difference has been that, whereas in ordinary muscular action the nerve stimulus is enough, we have here to apply a galvanic battery to insure the contraction of the muscle; but the result is the same, and in both instances it is beneficial.

We might give other illustrations of the same rule, that growth and health are everywhere dependant on exercise, natural or artificial; but we have said enough to establish our thesis, and, we trust, to attract more general attention to an all-important matter. We are no advocates of violent exertion of any kind, for this, as we have shown, is only too fatal to heart and lungs; but we strongly inculcate on parents, especially on those whose children are somewhat weakly, the necessity of physical education. Children who have no desire for the sports of their time of life ought not to be encouraged in their sedentary habits without some counterbalancing means of exercise. It is not good to heavily task either mind or body before they be properly developed. Children should neither be tired out with lessons nor with gymnastics, but they should have something of both.

DREAMS AND THEIR CAUSES.

BY AN OLD PHYSICIAN.

THE basis of a dream, as Dr. Hammond observes, must be sought for in impressions made upon the mind at some previous — perhaps apparently forgotten — period, or produced at the time, during sleep, by bodily sensations. At first sight, it may seem that we have dreams which cannot possibly be referred to either of these exciting causes; "but thorough investigation will invariably reveal the existence of an association between the dream and some such ideas or events." In confirmation of this view he adduces several cases, some of which he has collected from the well-known works of Abercrombie ("Inquiries Concerning the Intellectual Powers and the Investigation of Truth"), Macnish ("Philosophy of Sleep"), Dendy ("Philosophy of Mystery"), and other British writers; while others are original and now first published. From the latter we borrow the following remarkable history, which in some respects resembles the story told by Sir Walter Scott to Abercrombie, regarding the recovery, by means of a dream, of lost documents necessary for the successful prosecution of a law suit. A lawyer, well known to Dr. Hammond, found it necessary to ascertain the exact age of a client of his, who was also his cousin. Their grandfather, who was rather an eccentric person, had died when they were boys. The lawyer often told his cousin that if the grandfather had been alive the desired information could have been readily obtained; and that he had a dim recollection of having seen a record kept by the old gentleman, and of there being some peculiarity about it which he could not recall. Some months after the search had been given up as hopeless, he dreamed that their grandfather came to him and said, "You have been trying to find out

when J. was born. Don't you recollect that one afternoon, when we were fishing, I read you some lines from an Elzevir 'Horace,' and showed you how I had made a family record out of the book by inserting a number of blank leaves at the end? Now, as you know, I devised my library to the Rev. ——. I was a great fool for giving him books which he will never read! Get the 'Horace,' and you will discover the exact hour at which J. was born." The lawyer, deeply impressed with the dream, started by the first morning train to visit the clergyman, who lived in a neighboring city; found the "Horace"; and at the end were the pages constituting the family record, exactly as had been described in the dream. By no effort of his memory could he recall to his recollection the incidents of the fishing excursion.

It may have occurred to some of our readers to have experienced the same dream on two or three consecutive nights, or several times in the same night. This repetition of a dream is popularly regarded as indicating that it is either sent as a warning, or that it has a prophetic character. Dr. Hammond tells us that a few years ago he read Schiller's "Ode to Laura," as translated by Lord Lytton, beginning —

"Who and what gave me the wish to woo thee?"

and admired it as a striking piece of versification, conveying some noted philosophical ideas in a forcible and beautiful manner. The following night he had a very vivid dream of a condition of pre-existence in which he imagined himself to be. The connection between the dream and the poem he had been reading was sufficiently well marked, and did not astonish him. He was, however, surprised to find that the two next nights he had exactly the same dream.

The following case, in which a dream — in other respects highly remarkable — occurred twice on the same night, came under the notice of the writer of this article when he was practising in London, in the year 1848. Our older readers may recollect, that, in the year just recorded, there was a terrible case of murder, Dr. Webster, Professor of Chemistry in Harvard College, being convicted for the murder of his acquaintance, — we can hardly say his friend, — Dr. Parkman. A lady — we will call her X. Y. — well known in the literary world, and then residing in London, had, some years previously, paid a long visit to this country, during which she became intimately acquainted with Dr. Webster and his family, who showed her much kindness and attention. After her return to England, she continued to correspond with the family; and one day, in the early autumn of 1848, a gentleman, related to Dr. Parkman, called upon her with an introduction from Professor Webster. On that night she went to bed at her usual hour, but soon experienced a horrible dream. She fancied that she was being urged by Dr. Webster to assist him in concealing a set of human bones in a wooden box; and she distinctly recollected that there was a thigh-bone, which, after failing to break it in pieces, they vainly attempted to insert, but it was too long. While they were trying to hide the box, — as she fancied, under her bed, — she woke in a state of terror and cold perspiration. She instantly struck a light, and tried to dispel the recollection of her horrible vision by reading. After a lapse of two hours, during which she had determinedly fixed her attention on the book, she put out the light, and soon fell asleep. The same dream again occurred; after which she did not dare — although a woman of singular moral and physical courage — to attempt to sleep any more that night. Early on the following morning she called upon the writer, and told him of her fearful experiences of the past night. Nothing more at the time was thought of these dreams; but shortly afterwards the news reached England that Dr. Parkman was missing; that the last time he was seen alive he was entering the college gates; and that the janitor was suspected of having murdered him.

On the writer mentioning this to X. Y., she at once exclaimed, "Oh,

my dreams! Dr. Webster must be the murderer!" The next mail but one brought the news that the true murderer had been detected; and that, at the very time when X. Y.'s dream occurred, he must have been actually struggling to get the bones — the flesh having been previously burnt — into a wooden box such as she had seen; and that, after attempting in vain to break the thigh-bones, he had hidden them elsewhere.

In this remarkable case, the visitor's call, and his conversation regarding their mutual friend, may have suggested to the mind of X. Y. the idea of Dr. Webster; but why it should have called him up to her mind as engaged in that singular manner, we admit that we cannot explain, as he had not seen her for some years. It is in the highest degree improbable, that, when engaged in this horrible attempt to conceal the evidence of his guilt, he should have been specially thinking of X. Y.; otherwise we might have explained the dream according to the "Brain-wave Theory," propounded in the London *Spectator* for January 30, 1869. It is possible, but highly improbable, that the idea of the bones might have been called up by the circumstance that X. Y. had recently been occupied in compiling a popular course of lectures on anatomy and physiology for a country physician; and we cannot regard her case as upsetting the theory we have propounded, —that dreams must be due either to impressions made upon the mind at some previous period, or that they are produced during sleep by bodily sensations.

We shall now proceed to illustrate the latter of these exciting causes. Abercrombie, in his well-known work, to which we have already referred, relates several very remarkable cases of dreams induced by impressions made upon the mind during sleep. In one case, an elaborate dream of the same nature was simultaneously excited in the minds of a soldier and his wife, by the noise produced by the falling of a pair of tongs.

An officer on board a transport used to be teased by his companions, who could produce in him any kind of dream by whispering in his ear. Once they conducted him through the whole process of a quarrel, which ended in a duel; and when the parties were supposed to have met, a pistol was put into his hand, which he fired, and the report of which awoke him. On another occasion they found him asleep on the top of a locker in the cabin, when they made him believe that he had fallen overboard, and exhorted him to save himself by swimming. They then told him that a shark was pursuing him, and entreated him to dive for his life. He instantly did so, and with so much force as to throw himself from the locker upon the cabin floor, by which, of course, he was awakened.

Many cases are on record in which dreams have been excited by other senses than that of hearing. A remarkable case, in which a dream was originated by the combined action of the senses of smell and hearing, is described in the "Journal of Psychological Medicine," for July, 1856, in which a physician, who was compelled to sleep at a cheesemonger's house, in a bed-room impregnated with a strong odor of cheese, and swarming with rats, dreamed, that, for a political offence, he was incarcerated in a huge cheese, which was attacked by an army of these vermin, that, as soon as they had effected an entrance, fixed themselves on his naked body.

The sense of taste is so seldom exercised during sleep, that it is rarely productive of dreams. The following case is the most remarkable one of the kind that we have met with. A young lady who had contracted the habit of sucking her thumb during sleep, tried to break herself of the practice by covering the offending organ with extract of aloes, before she went to bed. She slept well, but in the morning she found her thumb in her mouth with all the aloes sucked off. During the night she dreamed that she was crossing the ocean in a steamer made of wormwood; that the plates, dishes, chairs, etc., were composed of the

same material; and that there was a bitter smell all over the ship. There was so strong a bitter taste in her mouth, that on her arrival at Havre she asked for a glass of water; but the attendant brought her an infusion of wormwood, which she gulped down. On her requesting a Paris physician to extract the wormwood from her body, he told her that the only remedy was ox-gall, which he gave her by the pound. The bitter taste of the remedy was as bad as that of the wormwood; and to get rid of it she applied to the Pope, who told her that she must make a pilgrimage to the plain where the pillar of salt stood which was formerly Lot's wife, and must eat a piece of salt as large as her thumb. She reached the object of her journey, and then deliberated as to what part of the figure she should break off. The result was, that, as she had a bad habit of sucking her thumb, she should break off and suck that part of the statue. On putting the broken fragment into her mouth she awoke, and found that she was sucking her own thumb.

Dreams are very readily excited through impressions made on the nerves of ordinary sensation, even in cases when the stimulus is applied to paralyzed limbs. A lady whose lower extremities were paralyzed, often experienced remarkable dreams of this nature when hot bottles were applied to her feet. On one occasion she dreamed that she was transformed into a bear, and was being taught to dance by being made to stand on hot plates of iron. On another similar occasion she dreamed that she was wading through a stream of water that issued from a hot spring.

In the cases which we have here put on record, the dreams, with one exception, have not been intentionally evoked. In order to prove that almost any kind of dream can, with tolerable certainty, be excited by special classes of stimulants, M. Maury caused a series of experiments to be performed on himself when asleep, which afforded very satisfactory results.

First experiment: He caused himself to be tickled with a feather, on the lips and inside of the nostrils. He dreamed that he was subjected to a horrible punishment. A mask of pitch was applied to his face, and then torn roughly off, taking with it the skin of his lips, nose, and face.

Second experiment: A pair of tweezers was held at a little distance from his ear, and struck with a pair of scissors. He dreamed that he heard the ringing of bells. This was soon converted into the tocsin, and this suggested the days of June, 1848.

Third experiment: A bottle of eau de Cologne was held to his nose. He dreamed that he was in a perfumer's shop. This excited visions of the East; and he dreamed that he was in Cairo, in the shop of Jean Marie Farina. Many surprising adventures occurred to him there, the details of which were forgotten.

Fourth experiment: A burning lucifer match was held close to his nostrils. He dreamed that he was at sea (the wind was blowing in through the windows), and that the magazine of the vessel blew up.

Fifth experiment: He was slightly pinched on the nape of the neck. He dreamed that a blister was applied. And this recalled the recollection of a physician who had treated him in his infancy.

Sixth experiment: A piece of red-hot iron was held close enough to him to communicate a slight sensation of heat. He dreamed that robbers had got into the house, and were forcing the inmates, by putting their feet to the fire, to reveal where their money was. The idea of the robber suggested that of Madame D'Abrantes, who, he supposed, had taken him for her secretary, and in whose memoirs he had read some account of bandits.

Seventh experiment: The word *parafagaramus* was pronounced in his ear. He understood nothing, and awoke with the recollection of a very vague dream. The word *maman* was next used many times. He dreamed of different subjects, but heard a sound like the humming of bees. Several days after, the experiment was repeated with the words *Azor*, *Castor*, *Léonore*.

On awaking, he recollected that he had heard the last two words, and had attributed them to one of the persons who had conversed with him in his dream.

Eighth experiment: A drop of water was allowed to fall on his forehead. He dreamed that he was in Italy, that he was very warm, and that he was drinking the wine of Orvieto.

Ninth experiment: A light, surrounded by a piece of red paper, was repeatedly placed before his eyes. He dreamed of a tempest and lightning, which suggested the remembrance of a storm he had encountered in the English Channel in going from Merlaix to Havre.

These observations are very instructive, inasmuch as they show conclusively that one very important class of our dreams is due to our bodily sensations.

From Once a Week.

POISONOUS EFFECTS OF ORANGE PEEL. Many years ago, says Dr. Gibbons, two little girls, sisters, four and six years of age, were seized with violent inflammation of the bowels from swallowing the rind of the orange. One of them died in convulsions, and the other had a narrow escape. Quite recently, a child something over a year old was attacked with violent dysenteric symptoms, for which no cause could be assigned. The attack came on during the passage of the family on the steamer from San Diego. The symptoms were identical with those which had previously been noticed to arise from poisoning by orange peel; and on inquiry, we were informed that it had been playing with an orange and nibbling at it just before the attack of disease. The discharges from the bowels were frequent and painful, and consisted of blood and mucus. After a week of severe enteric inflammation, the child died. We have no doubt that the disease was brought on by the rind of the orange. Though but a small quantity must have been swallowed, yet a very small quantity of such an indigestible and irritating substance will often produce the most serious consequences. The oil of the rind is highly acrid, and adds greatly to the noxious quality of the indigestible mass. We learn that it is a common practice among children at some of our public schools to eat the rind, and that juvenile merchants have been known to trade off the inside of the fruit for the skin.

EDUCATION AND INSANITY.—In most of our cities and large villages, nearly all the children commence attending school as early as the age of three or four, and attend five or six hours each day for several years. The proportion of insane to sane persons in this country is one in every 262; in Scotland it is one in every 574; in the agricultural districts of England it is one in 820; in London the proportion is one in 400. We see thus that insanity is more prevalent in cities, and less so in the country, evidently due to the greater strain made on the mental faculties from infancy to middle life in cities, and to the fact that mental activity is there also allowed a greater scope. Political liberty, singularly enough, has some hand in this matter; for in countries, under a despotic government, insanity is rare, as in Turkey, China, and Russia. Dr. Brigham affirms that it is, or rather was, uncommon in Spain, out of the large cities; it will be a curious physiological inquiry to discover whether the recent Spanish revolution has increased, or will increase, the tables of insanity.

CHINESE LEPERS.—Skin diseases play a very prominent and terrible part in Canton. On one part of the river we saw a number of poor boats huddled together, with an inscription on pink paper floating from a pole. The aspect of the poor souls in these boats, men, women, and children, was terrible and melancholy. They were a colony of *lepers*, waiting for a funeral to pass by. It seems their prescriptive right to stop any funeral procession on the river and to ask for alms, which are never refused.

CATARACT.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

IN our article on "Cataract in Children simulating Near-sightedness," we have briefly explained what cataract is. We propose here to enter into a more detailed explanation of cataract in general; what it is, the causes of it, and its treatment by the ophthalmic surgeon. To do this, let us once more look at the section of the human eye.

Fig. 1.

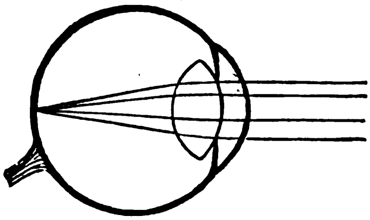
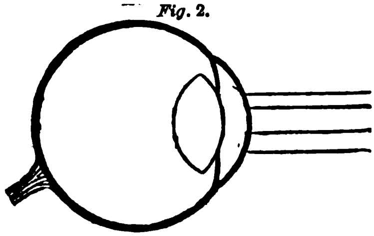


Fig. 1, the optic nerve is seen entering the eyeball from behind; and through the transparent part of the eye in front, rays of light are coming, which pass through the pupil, the round hole in the iris, or colored portion of the eye; here they meet the double convex lens called the crystalline, and are further refracted to a focus on the retina, where a picture of the external object is painted, exactly as in the *camera obscura*, or the photographer's apparatus. If the rays of light cannot reach the pupil, and so on to the retina, then the person cannot see with his eye.

Here again we want to be more explicit as to what cataract is *not*. On this point there is very great ignorance in the community, and there prevails among some in the profession a loose way of speaking of cataract. The eye and its humors are perfectly transparent through to the back part of the eyeball, where the retina is. The cornea, or clear part of the eye in front, like our watch-glasses, is one of the most transparent objects in nature. If it is dulled in any way the passage of the light is obstructed, and the patient proportionally blind. Now in *Fig.* 2, let us suppose the transparent

Fig. 2.



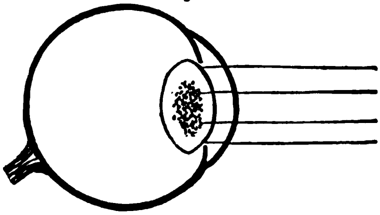
part of the eye has from any cause become opaque, and we see the rays of light are stopped by it, although the interior of the globe may have remained perfectly healthy, and thus the patient is blind. Now this clear part of the eye or cornea is quite thick and tough, and withstands injury more than would be imagined. It is, however, liable to ulceration and inflammation, both of which may leave permanent whitish spots or scars on it, thus rendering those portions of it so affected opaque. If such opacities cover the central portion, directly in front of the pupil, the rays of light cannot penetrate the eye for the patient to see by. Such spots on the cornea are frequently called "*pearls*" by the community, and supposed to be a "*sort of skin*" growing over the eye, which can be readily removed by the ophthalmic surgeon. In reality, however, they are scars, and can rarely, if ever, be removed or made transparent, especially if they have lasted some time. *Fig.* 2 represents such an eye, where we see that although the interior of the eye is perfect, the rays of light cannot penetrate the opaque cornea, just as we could not see the time on our watch if the watch-glass was opaque, or made of ground-glass.

Whenever the surface of the cornea is rough, or broken by injury, ulceration or inflammation, and a solution of sugar of lead is applied to the eye, there will result a deposit on and in the tissue of the cornea. In other words, we shall have a white film or flake of lead perfectly opaque. The consequence is that the unfortunate patient will be blind just in proportion to the size of this white spot or deposit, which *can rarely ever be removed* by the surgeon, as it is incorporated in the tissue of the cornea. The practical point is, that about all the so-called "eye-waters," sold under some quack doctor's name, contain this sugar of lead, which has blinded many an unfortunate person who has been advised by friends, or *the apothecary*, to purchase such nostrums. Acetate, or sugar of lead, is a weak astringent, and can be used with safety when there is slight conjunctivitis, or what is called a *cold in the eye*. There are, however, other much better mineral astringents, the use of which is unaccompanied by danger. It is not very safe for the patient or his friends to decide whether there is simply a cold, or further trouble requiring proper treatment.

We have now learned what cataract *is not*; let us, therefore, see what it is, and what can be done for it. You see in *Fig.* 1, behind the pupil, a double convex lens, called the crystalline. This must, as you also see, be transparent, for the rays of light to pass through it, and make a picture of the object on the retina in the back of the

eye. When the lens is opaque, from whatever cause, it is called cataract, and the person having it is blind in proportion to the degree and extent of the opacity, since the rays of light are stopped from passing to the retina, as we see in *Fig.* 3. The

Fig. 3.



pupils of a person with cataract, instead of looking jet black, as natural, will appear whitish, or yellowish white, because we see the opacity of the lens, placed just behind the pupil, or hole in the iris. There is an alkaloid called *atropia*, made from the roots of the belladonna plant, or deadly nightshade, a solution of which, dropped into the eye, causes, without any pain or trouble, the pupil to dilate widely, so that the surgeon can then see almost all of the crystalline lens, and at once decide in reference to the cataract by throwing the light in side-ways, and also by means of a peculiar mirror, called the ophthalmoscope, which reveals the slightest trace of opacity of the lens. The reason people with cataract see better at twilight, and shade their eyes, or turn their back to the light or window, etc., is that the absence of the stimulus of light allows the pupil to dilate, and the light can then enter the pupil at the sides, where the lens is thinner, and where it generally becomes opaque last. When the surgeon puts atropine into a patient's eye who has cataract, they naturally see better, and say they "*have more light*." The quack, especially the travelling charlatan, takes advantage of this fact to cheat his dupes by. He, for instance, sees the pupil is colored instead of black, and knows enough to judge there is cataract. For a stipulated sum, *to be paid down*, he agrees to cure the cataract "without medicine or the knife," and warns the poor patient not to go near any eye hospital, or ophthalmic surgeon, for he will be sure to be operated on. The dupe submits, therefore, to paying the fee, and having atropine put in his eye, which dilates the pupil and gives more light, if not more sight. Of course there is no cure, as the cataract goes on increasing; and as soon as the application of the atropine is stopped, the pupil contracts again, leaving the patient even worse than before. The dupe now starts to hunt up the advertising oculist again, but finds he has vanished, and will, most prob-

ably, be found in the next town or village with the dupe's case in newspaper and handbills, placarded as a cure "*without medicine or knife.*" This we have seen in all ranks and conditions in life, more often than it would seem possible for it to occur. The difficulty is just here. The daily newspapers, all of them, all over this country, make their money by advertising quack doctors and quack medicines. A large share of the money paid to and for these latter, goes into the newspaper proprietors' pockets.

The crystalline lens in the human eye is contained in a sort of envelope or capsule. The edge of the pupil, or rather the inner edge of the iris, lies against this capsule. Now, when the iris, as is very frequently the case, becomes inflamed, lymph is exuded from the iris on to the capsule of the lens in the pupil. This lymph becomes organized into a film or membrane, and as it of course stops the rays of light from entering the pupil, it was called, in old times, "spurious cataract." By *cataract* nowadays is always meant opacity of the crystalline lens itself.

What, now, are the causes of cataract? Some we know very well, but others are quite shrouded in obscurity. Injuries of the eye produce cataract. The lens will become opaque when a jar or shake, as from a railroad accident, or a blow on or near the eye, has caused the suspensory ligament of the lens to be broken so that it is detached. Any puncture of the lens, even the slightest, from needle, pin, glass, piece of steel, splinter of wood, fragment of percussion cap, broken spectacle frame, *et cetera*, any of these, or the many other foreign substances liable to enter the eyeball, may cause opacity of the lens, and thus what we call *traumatic cataract*, to distinguish it from that arising without direct cause.

Cataract is liable to accompany some diseases. In diabetes, for instance, where the watery constituents of the blood are deficient, cataract will come on, generally, however, when the patient is broken down by the long continuance of the disease. In connection with this it may be stated that thick syrup injected under the dorsal skin of the frog, produces cataract in the animal, which is permanent. This is a fact which has been long known. It has also recently been shown that the consumption of bread containing ergot of rye, leads to the development of cataract. As a matter of course, all the various diseases affecting the inner coatings of the eye may finally lead to the formation of cataract by the nutrition of lens being interfered with. The deposits of lymph organizing into membranes in the pupil may lead to cataract in a similar way. As a general rule, however, cataract is a disease of old age, the lens becoming grad-

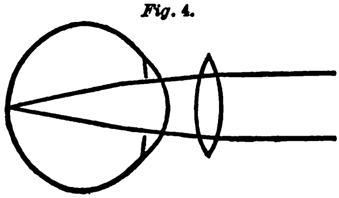
ually opaque from deficient nutrition, and inadequate blood-supply causing diminution of the watery constituents of the lens. Cataract may also be congenital, as we have previously described in explaining how it may then be mistaken for near-sightedness. Cataracts may vary in color from a milky white to a jet black. When of this latter color, the pupil will of course look black, as naturally, and hence the person supposed not to be suffering from this disease. Sometimes cataracts, as in young persons, are perfectly soft, like jelly or sago; and sometimes, as in old people, as hard as wax or glue, or even containing chalky concretions. All these different conditions have to be understood and considered by the ophthalmic surgeon, when he has a case to operate on.

The symptoms of commencing cataract are a slowly increasing diffused mist, thin cloud, or gauze intervening before the eye and external objects. The cataractous person generally also sees better sideways than straightforward. As we have said, in twilight or partial daylight, the person will see better by the pupil's dilating more from the absence of the stimulus of light. A candle or street lamp seems expanded out into a larger flame. Objects like the moon, are often seen multiplied. This description will perhaps enable the laity to judge somewhat whether a person has cataract. The ophthalmic surgeon, by dilating the pupil with atropine, and examining with the ophthalmoscopic mirror, can, of course, decide the point instantaneously. Amaurosis, or absence of perceptive power in the retina, may cause a person to simulate a cataract patient. Moreover, a peculiar disease of the eye called glaucoma, may render the pupil quite of a greenish yellow color, and so imitate cataract, till the light from the surgeon's opthalmoscope shows that there is no opacity of the lens at all.

How, now, can we cure cataract? Here we want to be very clearly understood, as great ignorance prevails on this point in the community, continually kept up and fostered by the false advice of advertising quacks and travelling charlatans. When a cataract has once commenced to form, there is no medicine to be taken, or any local application made, which can in any way whatever affect it in the slightest. Relief can only be obtained by an operation, after the cataract is sufficiently formed, or "*ripe*," as it is called. Cataract operations are very delicate, and require knowledge, skill, and experience; hence they are rarely attempted by the quacks, who advise their applicants not to go where they will be operated on, and generally succeed in getting money out of them by ordering some patent medicine or other, *et cetera*.

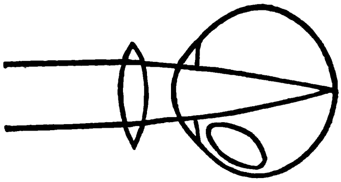
Three methods have been devised for operating on cataracts, all of which have in view the removal of the opaque lens or cataract from the pupil, so as to allow the rays of light to pass through to the retina, as we see in *Fig.* 4. The removal of the lens from

Fig. 4.



between the light and the retina, is a very old operation. Xenophon, in his Anabasis, so familiar to school-boys studying Greek, relates that Cyrus sent one of his generals to Egypt to be operated on for cataract by the ophthalmic surgeons there. This removal of the lens to a lower position, as is seen in *Fig.* 5, was done

Fig. 5.



by passing a needle in through the pupil and pressing it down, or passing in the needle behind the iris and turning the lens over. But we must only mention this operation to condemn it, as it is never practised nowadays, since the crystalline lens remains in the eye, and acts like a foreign substance, perhaps years afterwards setting up inflammation, and so destroying the sight. Another method was to prick the cataract with a needle, and by breaking it up let it absorb. This is still done with soft cataracts of children. It is of course a slow process, requiring to be repeated. No cataract in the adult should be thus operated on, as the centre of the lens is hard, and will not disappear without risk of dangerous inflammation.

The third method, now universally adopted, is the entire removal of the opaque lens from the eye. This seemingly bold operation was first done by a French physician named Daviel, in 1740. Of course, since then, very great improvements have been made in the various steps of the operation, as well as in the treatment before and after. Modern surgery now loses but three per cent. of the eyes operated on, instead of fifty per cent., as was done one hundred years

ago. The precise method now being universally adopted, is that of the late lamented Prof. Græfe, of Berlin, who stood at the head of ophthalmic surgery. It is the following: A narrow delicate knife is passed through the sclerotic so as to transfix the eyeball in front of the iris, and made to cut its way out, leaving a wound large enough for the cataract to come through. A piece of the iris is removed with delicate forceps, and the capsule of the lens punctured so as to allow the cataract to escape through the wound, which is accomplished by delicate pressure with an appropriate instrument. The eyes are then both most carefully bandaged, to prevent movement of the eyeballs, and the patient kept in the recumbent position from three to six or eight days. We have dismissed him within a week, but generally two weeks or more is required before the patient can travel to return home, if he live at a distance. By that time the eyes can be tested for cataract glasses, and of these they will need one pair for looking at distant objects, or to go about with, and another pair to read or sew with. *Fig.* 4 explains why the patient requires a glass. It will be seen that the double convex lens within the eye, which, when opaque, constitutes the cataract, has been removed, and consequently we must replace it by another in front of the eye, namely, the spectacle-glass. Here again we want to be explicit, as much ignorance prevails as to the power of sight cataract patients ought to have after operation. This does not depend so much on the operator, skilful as he must be, as it does on the cataract itself; *i.e.*, whether it was produced naturally, so to speak, by old age, or was the result of some disease of the eye, since in the latter case, sight will not be so much improved after the opaque lens has been removed from the pupil. In these days of ether and chloroform, one or the other is always administered, so that the patient suffers no pain, and after the operation is often unable to say which eye was operated on. Their joy at restored vision, and their thanks for sight, are the reward of the ophthalmic surgeon who has persuaded them to submit to, and has successfully carried out a cataract operation.

THE THERMOMETER IN DISEASE.—The *Brit. Med. Jour.* hopes "it will not be long before every intelligent mother of a family is familiar with the use of the thermometer for the discovery of disease. In many respects, it is far more reliable than the tongue or the pulse. As a means of ascertaining when it is desirable to consult a doctor, and when advice may be deferred with safety, it would be invaluable. By its aid the difference between insignificant skin-rashes, which will disappear in a day or two, and those which imply a constitutional fever, may usually be satisfactorily determined. Under many circumstances, the early discovery that a child was sickening for scarlatina or measles might be of great importance."

HOW TO BRING UP BABIES.

Part III.

COMPLAINTS INCIDENT TO CHILDREN.

IN former articles, the best and most rational manner of rearing babies in a state of health was pointed out, and how the most common complaints of early infancy, though in some degree natural to them, are much increased, and the sufferings they cause much enhanced by mismanagement. We will now consider the most important fevers which attack young children, including such hints on their management as may, we hope, be of real service to some of the patients; for though we have little power to check the course of any of these diseases, yet much may be done in the way of prevention, and in lessening the tendency to those complications which so greatly increase their mortality.

There are a few facts about the *acute specific diseases*, measles, whooping-cough, scarlet fever, small-pox, chicken-pox, typhus and typhoid fevers, diphtheria, and croup, with which every mother should be acquainted. These are all more or less contagious, small-pox, whooping-cough, and scarlet fever most so; they all run a definite course, which cannot, so far as we know at present, be cut short by any special remedy; they are all attended with a more or less high degree of feverishness; and though the disease, in every case, affects the whole system, yet each particular disease also specially affects some one or more organs of the body. These complaints are also, with the exception of whooping-cough, diphtheria, and croup, characterized by some peculiar rash upon the skin.

Measles is most common in infancy and early childhood, but may occur at any age; the child may have been ailing for a few days, when it becomes drowsy and fretful, and appears to have a bad feverish cold in the head, with watery discharge from the eyes and nose, and slight sore throat; on the fourth day of these symptoms a mottling rash of a faint mulberry hue first appears on the forehead, about the roots of the hair; this soon spreads over the whole body in little dusky spots, which often run together into curved patches; the rash subsides in three or four days, or a week.

Inflammation of the lungs is particularly liable to occur in connection with the measles, and should be guarded against by every precaution. Rest in bed in a moderately warm room, with milk diet, are all that is necessary in an ordinary case of measles. The disorder usually subsides in from a week to ten days.

Whooping-cough.—This complaint is usually preceded, for a week or a fortnight, by a slight cough, having no particular character; then it becomes distinctly paroxysmal,—that is to say, each fit of coughing consists of a rapid succession of coughs, lasting until the breath is quite exhausted, and the child seems to be at the point of suffocation, whan a deep breath is drawn, usually with the loud and characteristic "whoop," and in a few minutes the child begins to play as if nothing had happened; in more serious cases the cough produces much exhaustion, and sometimes from its violence causes bleeding from the mouth and nose, or red patches on the eyes, from rupture of some of the small superficial blood-vessels.

This disorder runs its course in about a month, but the peculiar cough may, in weakly children, be continued for months. Babies frequently have the whooping-cough without ever giving the characteristic "whoop," and children of three or four years do so sometimes. The violence of the cough may be, to a certain extent, allayed by appropriate medicines; the child should be kept in a warm but well-ventilated room, and supplied with light, nutritious diet. After a month, if the cough does not soon cease, a change of air, especially to a warm sea-side place, has usually an immediately salutary effect. Tonic med-

icines are very useful when the specific stage of the disease has passed.

Scarlet fever, or *Scarlatina*, are two terms having exactly the same meaning, though the latter, *scarlatina*, is often regarded popularly as signifying a milder form of the fever. The disease begins with feverishness and sore throat; on the second day, or sometimes the third, a scarlet rash, like that produced by a mustard poultice, appears, first at the top of the chest, and then gradually spreads all over the body. Even in its mildest form, this disease is a dangerous one, and for this reason, that it is then more likely to be neglected.

The one thing, above all, to attend to in scarlet fever is, to *prevent the little patient from becoming chilled:* the room should not be over-heated, but it should be kept of a constant warmth. In the absence of a good physician, the following will be found very useful and efficient. "As soon as the signs or symptoms are sufficiently marked to make it certain that the complaint is scarlet fever, let the child be undressed and put to bed, cover the abdomen with a dry flannel, then take a bed-sheet, fold to sufficient size, put it into boiling water, and wring as dry as possible, by means of dry towels, and apply to the abdomen of the child, *over*, or on the outside of the flannel previously placed there, and cover the wet, hot sheet with other dry flannel." "In the meantime, prepare some lemonade, make it warm and rather sourish, to which add a small quantity of the mucilage of gum-arabic, and let this be the only drink given while fever is present." "The hot cloth should be changed, or replaced by another, as often as it becomes cooled, until perspiration is induced, which may take place within ten minutes of the first application, if the case happens to be a very mild one, but in some cases may require two hours." "The child will soon fall asleep after the perspiration has commenced, and on awaking, will show slight symptoms of inclination for food." "Should the bowels require attention, administer an injection of oil, soap, and water, of suitable strength and quantity to the age, and the requirements of the occasion." When the rash fades, which takes place in about a week or ten days, the skin begins to peel off: this process lasts about a month; and during this period the child is liable to an attack of *dropsy*, from inflammation of the kidneys: a slight chill is the most common cause of this most serious complication, which is very often fatal. It must especially be borne in mind that dropsy is just as likely to follow the mildest as the most severe form of the disease, and the child should therefore be kept in bed for at least a fortnight, and in one room, until all scaling has ceased.

In some epidemics the throat symptoms are very severe, the ulceration being very intense, and the swelling of the throat outside very great; in these cases it is often necessary for the doctor to make applications to the throat, and much depends upon the mother or nurse in aiding him, and carrying out all his directions.

Warm baths and frictions of the skin give great relief, and are very useful in the *scaling* stage of scarlet fever. The child should not be allowed to go out until all trace of shedding of the skin has ceased. The clothes should be frequently changed; and the room in which there has been scarlet fever should be thoroughly cleansed and whitewashed.

Small-pox. — Prevention is better than cure, and a proper regard to sanitary laws is the best preventive against this terrible disease.

Chicken-pox is a very common and a very mild disease, affecting infants and young children. On about the fourth day of slight feverishness of no very definite character, a few spots, small oval blisters, like pearls, appear about the shoulders, or chest, or arms, sometimes on the face and head; each of these spots is surrounded by a small area of redness; the disease lasts eight or ten days. In delicate children, the spots, instead of drying up in the ordinary way, become more sore, forming little festers, which are troublesome to heal; tonic medicines

and change of air, however, soon restore the child to health. Care must be taken lest the child catch cold during this trifling disease, or serious lung disease may be the result.

Typhoid fever is a very serious disease, but in its characteristic form rarely attacks children before they are five or six years old. It is often very difficult to distinguish it from other diseases, acute consumption, etc. Sudden illness, fever and headache, with subsequent delirium or wandering in the head at night, with great general weakness and looseness of the bowels, are the chief symptoms: some characteristic spots usually appear about the eighth day. This disease usually results from defective drainage, neglected privies, and cesspools.

The *Remittent Fever* of infants, characterized by diarrhœa and a feverishness, becoming more intense at certain times of the day, and attended with great weakness and occasionally delirium, is probably typhoid fever in a modified form.

Diphtheria.—This disease, though it has prevailed at various places at intervals during the last two or three centuries, appeared as a destructive epidemic at Boulogne in 1855, in England as almost an unknown disease in the following year, and in this country about the same time, and has remained with us, in more or less activity. It may attack the youngest infant or the most aged man. It is very contagious; and nurses or mothers should be very careful not to get any material from the throat or mouth coughed into their faces.

Diphtheria begins with a sense of illness and languor, with some headache and sickness; the throat then becomes sore, the glands outside the throat enlarge, and white patches may be seen in the interior of the throat. This disease may be mistaken for an ordinary ulcerated throat, or the reverse; but as it is of great importance to detect it in time, all sore throats, during an outbreak of diphtheria, should be closely attended to. In the early stages of diphtheria, a small piece of gum camphor of the size of a pea, held in the mouth and gradually dissolved and swallowed, will be found useful as a stimulant to the parts affected, by inciting to a more healthy action. It may be necessary to repeat the above at short intervals, *but in no case should the quantity be increased.* In the absence of the gum the spirits of camphor can be employed, by pouring a small quantity upon a handkerchief or sponge, and let the patient inhale it, but great care is necessary not to use too large a quantity. Careful nursing, and cleansing the throat with disinfecting lotions, are necessary in this often fatal disease; and rigid performance of all medical directions must be observed. The diet must consist of nutritious fluids.

Croup is a special form of inflammation of the windpipe, attended with the formation of a membranous skin in its interior, which may extend down the air-tubes. It is a very serious disease of infancy and early childhood, and requires very prompt treatment. It begins with the symptoms of a feverish cold in the head, attended with cough, which in a few hours becomes husky, and the cry hoarse; then the cough becomes peculiarly metallic, or, as it is usually described, "brassy;" and presently the breathing, which was before only "wheezing," becomes difficult and labored, the breath being drawn in with a prolonged crowing or cooing noise. All these symptoms increase, and the child is in the greatest distress until the disease either recedes or the little sufferer is released.

Treatment may do a great deal in this disease, if it be taken in time. The child should be put in a warm-bath, the room warmed, the bed brought near the fire, on which a kettle of water is placed, so that the steam from the spout shall come into the room and moisten the air. The doctor must be at once sent for.

False Croup is not uncommon in children, especially while teething: it is a spasmodic affection of the windpipe. The attacks are irregular, and there is but little or no fever. Warm baths, slight aperients, and tepid sponging are the best remedies.

WOMEN'S DRESS.

BY ROBERT WHITE, JR., M.D., BOSTON.

Second Paper.

How the Clothing should be Suspended.

Do not understand me as recommending that a brace similar to that worn by men is the best mode of suspending ladies' clothing; it is better than the bands about the waist, but many modifications of the common brace can be adopted that will be greatly superior to the waistband. It is the superiority of the *principle* of the shoulder-strap, over that of the waistband, that we insist on, rather than on the use of the article itself. If one-half the ingenuity and talent employed by woman in devising means of display in dress, was brought to bear in naturally adpating the costume to the requirements of the form, some means would be quickly found that would support the clothing more naturally; and, at the same time, be pleasing and satisfactory to all. The flowing skirt is undoubtedly the form of dress best adapted to women in all conditions; probably no other style could be devised (or certainly never has been devised) that would be equally becoming and graceful to the romping school-girl, the dignified "young lady," the stately matron, and the bending form of the aged grandmother, so that probably we shall be compelled to accept this as the style of dress to be worn by this generation at least, and it is well, therefore, that a means of support should be provided that will insure the comfort of the wearer without detracting from the gracefulness of the garment. I cannot be expected to furnish the details of what this shall be. The principle on which the dress should be supported has been stated; and further than this we can only give some general ideas of some of the special modes of support that we have knowledge of, and of such improvements as may suggest themselves.

Waists.

The waists with bands over the shoulders and buttons for the attachment of the skirts which some ladies wear, are a very useful means of support, and when properly made and fitted to the form they do much toward taking the weight of the skirts off the waist, and their use is to be strongly recommended; a single waist can be made so as to support all the skirts but that of the dress, and this should be so loose as to be supported by its own waist. Of course if the under-waist is made so tight at the bottom as to closely compress the abdomen, it will be quite useless for the purpose designed. Woman's taste and ingenuity can devise plans for making them so neatly that they will add to, rather than detract from, the appearance of the form. These waists were much more generally worn formerly than now, and it is a pity that they were ever discarded, as their continued use would have prevented much injury to the health of women.

The Corsets.

This question of appearance brings us at once to the consideration of the corsets, for it is undeniable that these articles of dress are now worn mainly for appearance sake. When and by whom they were devised no one knows. It is said they were first introduced as a means of punishing refractory wives, by lacing the ladies up in them in the days when the husband's will was absolute, and "woman's rights" were unknown. If this is true, woman, with her usual skill, has converted the weapons employed against her, to her own use. For every other article of female attire, we can find some model, either in Nature or Art, however far fetched the comparison may be, but the most lively imagination can trace no resemblance between the corset and its use, and anything else in creation, except in the form of the wasp, or in some of the ancient statues of Pallas, where she is

presented wearing a breastplate of scales, the shape of which somewhat resembles the modern corset; but the learned and warlike goddess wore this for defence, not for the production of a small waist; and indeed, had she secured this great desideratum of modern time, she would probably have been safe from the solicitations of Vulcan; for with the Ancients, — gods as well as men, — the wasp-like waist of to-day would have been considered a deformity. It is strange that woman should have so far departed from the old models of female beauty that we see represented in the Greek and Roman statues that have been preserved to us. In all these the female waist is represented as full, round, and handsomely moulded, and could never have been restricted by bands or ligatures of any kind. I read lately of a gentleman visiting some ancient Italian sculptures in company with several ladies, when he took the handkerchief of one of them, encircled her waist with it, measuring the girth, and then passed it about the waist of one of the ancient Venuses that are models of what a beautiful female form was, showing the difference in size. He was an observing fellow, but a bold one, and probably got his ears boxed for his impudence. Surgeons sometimes employ a contrivance like the corset for holding broken ribs in place, but they would not dare to lace it as tightly as the corsets are worn by many ladies. Women dress to please the other sex (and to anger each other), but I assure them that the corset adds nothing to their attractions in the eyes of men, for but very few of that sex admire a small, stiff, wasp-like waist, — preferring the naturally full, rounded outline, which can never exist where the corsets are worn so tightly as to compress the waist to any great extent. Dr. Holmes, in his poem of "My Aunt," well describes this insane idea of tight-lacing:

"My aunt! My dear unmarried aunt,
Long years have o'er her flown;
Yet still she strains the aching clasp
That binds her virgin zone.
I know it hurts her — though she looks
As cheerful as she can;
Her waist is ampler than her life —
For life is but a span.
* * * * * *

"They braced my aunt against a board
To make her straight and tall;
They laced her up, they starved her down,
To make her light and small;
They pinched her feet, they singed her hair;
They screwed it up with pins.
O never mortal suffered more,
In penance for her sins!

The present mode of wearing the clothes suspended from the waist, united with the tight corset, restricts a woman in the exercise of every limb, as is seen in the fact that when she wishes to engage in any active work, off come the corsets; or at any rate the laces are slackened so that the muscles of the trunk and limbs may have full play. See how free and graceful the motions of children are in their loose and easy clothing, before they are put into the tight bands and ligatures that are considered necessary to make them appear graceful(?) Children's clothing is generally suspended by waists, and it is a pity that children of older growth should depart from the "customs of their childhood" in this matter. Our country girls are often and justly envied for their pretty rounded forms and ruddy cheeks, and freedom and ease of movement, and they gain these by being less entrammelled by the dictates of Fashion, and living more in accordance with the laws of nature, among which the wearing of tight corsets and suspending the clothes from the waist are certainly not to be found.

How Corsets should be Worn.

That corsets are *always* injurious I have not stated, for there are cases in which, when they are properly moulded and fitted to the form, they may be of great comfort and benefit to the wearer, such as cases of weakness or deformity; but the moment you lace it so tight as to compress the chest and abdomen, it ceases to be of benefit, and is productive of injury. A corset might be constructed, nicely fitted to the form, moulded at the top so as to receive and support the breasts when necessary, and the lower portion so shaped as to rest on the hips — not the waist — an elastic strap should pass over the shoulders, and be made adjustable to different lengths by buttons or buckles. Some means of attachment for the

skirts might be devised that would suspend them from the corsets, by buttons or otherwise, and yet allow their weight to be suspended mainly from the shoulders by reason of the straps passing over them. These straps should support the corset, and prevent it pressing too heavily on the hips; and if the corset is properly fitted to the hips, these will easily support what little weight comes on them. Remember there is a distinction between the waist and hips, and that the corset is to be so constructed that the weight of the skirts shall fall mainly on the shoulders. When women *will* wear corsets, some improvement of this kind can be easily devised by the *modiste*, and a single trial will be all that is necessary to convince any one of their superiority over the old style.

"Cotton."

Ladies generally are anxious for a full, graceful development of the "bust," an appearance which adds much to the beauty of a woman; yet many of them (ignorantly of course) adopt means which prevent the very effect they desire to secure, by allowing the pressure of tight corsets and thick cotton pads on the delicate organs which mainly give it form, while it should be left quite free and unrestrained, that it may attain to the beauty and grace which naturally belongs to it. Where these artificial abominations *will* be used, let some of the light, elastic, gauze materials, now being introduced, be used in preference to the old-fashioned pile of cotton; but the best of them are likely to do harm; as for their deceiving the other sex (for which purpose they are usually worn), I am pretty sure that they often fail of their intention, for men are not as verdant in such matters as women pay them the compliment of believing they are.

Open-neck Dresses.

One of the most glaring faults noticeable in the style of dress of women, in vogue just now, is the open-neck dress and sack of the past season or two, which I learn is to be in fashion again next season; thus compelling women foolish enough to adopt it, to expose the chest to the inclemencies of the weather, at the season men protect it by additional clothing and chest-protectors. The bad results of this style of dress were seen in the large number of pulmonary complaints in women, which received the attention of physicians during the past season. Women should be warned in time, and remember that it is only a short step from "a slight cold" to a merciless disease, which will cause them to regret their foolishness, when too late.

Garter and Boots.

It is no unjust slander on the women of our country, to say that their lower limbs are wanting in the beauty and development of those of women of most other nations. The causes of this are various. Want of exercise — for a part that is not used decreases in size — tight, small boots, which prevent the free movement of the muscles, and cause a dread of setting the foot down squarely, — so that their walk degenerates into more of a frightened, mincing style, than is necessary. These causes are pretty well known; but there is another prolific source of unshapely limbs, viz., — tight garters. Every woman is familiar with the vivid red mark on the skin left by the garter, after being worn in the usual manner even for a short time. Now garters never should be worn so tight. The stocking should be long enough to come so far up on the limb as to be easily secured, without excessive pressure; or the "stocking-supporter," now being adopted pretty extensively, should be used. The worst result produced by tight ligatures, is the affection called "varicose veins," in which the veins enlarge, assume a knotted appearance like a coiled snake, and sometimes burst, disfiguring the limb for life. This is often produced by the obstruction to the free passage of the blood through the veins, from the tight ligature around the limb. The boot now in fashion, with small heel near the centre, is very badly devised for any-

thing but an instrument of torture, for a woman cannot stand erect in them without throwing her body forward, to balance herself. Men find their boot-heels of two or three inches diameter little enough, for comfort, yet women wear those funny little heels of one-half inch, and pretend they are "so nice." That they are very *piquant* in appearance, is true; but their advantage ceases there, and is more than compensated by the overstrained ankles and deformed feet they cause.

I have concluded my list of complaints against "Women's Dress" for the present, and may be thought unreasonable in some of them; but as physicians are the only persons who know of the bad effects of some features of the dress of women as worn to-day, and as both the early mental and physical development of a nation is controlled, to a great extent, by its women, the great importance of the subject is my only excuse. Men care more for the health and comfort of their mothers, wives, sisters, and daughters, than for their own; so it becomes woman, for the satisfaction of others, as well as for the proper discharge of the important functions which belong to her, to maintain herself in the best possible physical condition.

> "Who would not give a trifle to prevent
> What she would give whole worlds to cure,"

should be remembered by every woman. The list of failings in women's dress has not, by any means, been exhausted in this article, but the main point intended to be spoken of, was the advantage of the shoulders over the waist for the support of the clothing; and if ladies will recognize the truth of this principle, and will act on it, either by adopting some of the means suggested,— waists or corsets with shoulder-straps, —or by some device of their own, I think the change will greatly diminish the many varieties and innumerable cases of "female diseases," thus adding largely to the number and usefulness of women, whose true *sphere* is the making of home happy, and the right training and development of youth,—and whose best *right* is to be loved, honored, and protected, by the stronger and hardier half of mankind.

THE ORIGIN OF LIFE.—Prof. Huxley's recent address before the British Association, will be everywhere read with intense interest—in many places with intense relief. He has admitted in set terms the doctrine *that life, so far as we can trace, proceeds only from life. Ex nihilo nihil fit* (from, or out of nothing, nothing comes) is a very old proverb, and after centuries of controversy science is coming round to recognize the truth of the adage. Not that Dr. Huxley altogether resigns the rather heterodox notion many expected him to advocate, for, after showing that science points clearly to the fact that life is the product of previously living organisms, he expressly stated that if he could look beyond the abyss of geological periods, he would anticipate seeing the evolution of living protoplasm from *not living* matter. We cannot dignify such an anticipation as a "philosophical faith." He does not deny that it is not a conclusion from the data before us. His own address throughout leads up to the very opposite conclusion, and the introduction of such a speculation jars upon us, as we calmly read his elaborate essay, like a loud discordant note amidst the murmur of soft melody. In fact, while Professor Huxley reasons carefully enough up to this point, and displays the docility of the philosopher to the teaching of science, here he appears to abandon himself suddenly to wild conjecture. Impatient of the limits imposed on human reason, he hazards a mere guess at the mystery which ever meets us. Of course, he is as free to guess as inferior minds; but when it comes to guessing, it may well be that a child is as wise as a philosopher.

THERE are the strongest of reasons for believing that death from lightning must be painless, the nervous system requiring a certain interval of time to become conscious of pain.

TO THE MOTHERS OF OUR LAND.

Educated Women in the Nursery.— The importance of the correct training of children beginning early, in the earliest stages of life, with a view of developing a child's intelligence, of laying a foundation for after-work, can hardly be over-estimated. The early age is peculiarly the impressible age, and that in which the temper is most readily influenced. Hence, instead of intrusting young children to nurses who are ignorant of the first principles of the laws of life and of healthy development, and who unite coarseness of language and manners with vulgarity of habit, as is too often the case, they should be intrusted only to persons of intelligence, education and refinement. Coarse and uneducated nurses do much harm in many ways. They sometimes frighten young children, producing a terrible and indefinite dread which is rarely, if ever, gotten rid of, in its influences on after life.

There are doubtless many ladies in our land, of education and refinement, who are not in circumstances of independence or competency as regards this world's goods; and who as a consequence are under the necessity of seeking some kind of employment. Many seek teaching, either public or private; but would it not be well if many more were to seek to become nurses, and thus take charge of children from an early age? This would be womanly work of the right kind. There is nothing really menial in the duties of a nurse, and nothing which the most exalted mother might not do herself, without lessening, in the smallest degree, her proper dignity.

Disease of the Velocipedist. —It is interesting to note that the working of a velocipede tends to produce so disagreeable a disease as Varicocele, and a varicose condition of the veins of the leg. A long continued obstruction of, or an undue amount of pressure upon, the veins of the extremities, especially where there is some inherent weakness of structure, will cause *Varix.* We therefore recommend all who suffer from Varix, or evince any sign or symptom of its appearing, to lay aside their velocipede, that further enlargement of the veins may be prevented, and if already distended, that the contraction of their coats may be induced.

The Sewing-Machine, and its Effects on Health.—The unfounded and absurd announcement promulgated that sewing-machines induced ovarian excitement of an undesirable character, turn out as foolish as they prove groundless statements — the ephemeral supposition of some fertile imagination. Those who work the sewing-machine, involve by their occupation no more danger to health, nor have any particular train of phenomena unnaturally increased, than those who follow sedentary occupations.

Effects of Godfrey's Cordial.— An inquest was held on Tuesday last, at Nottingham, on a child five months old, who, having suffered from diarrhœa, had "Godfrey's Cordial" administered to it by its mother. The child succumbed, and a post-mortem examination showed that death had been accelerated by opiates. A verdict in accordance was given, and the mother was reprimanded by the coroner, for her conduct in administering the "remedy." — *London Med. Times and Gazette.*

Carbolic Acid and Street Watering.—"During the summer, most of the crowded streets of London have been watered on alternate days with a weak solution of carbolic acid, as has been the custom for the last four years, and there is no doubt that this excellent antiseptic and disinfectant has been very beneficial in a sanitary point of view. The inhabitants of those streets have often expressed satisfaction at the freshness, and removal of disagreeable smells, which this acid produces, and they regard it as an addition to their comfort."— *Ibid.*

CHEMICAL TRANSFORMATIONS.

BEAUTIFUL perfumes are produced from substances not merely trivial, but in some cases fetid and repulsive. Fusel oil, putrid cheese, gas-tar, and the drainage of cow-houses, are thus transformed; the result is a triumph of chemistry; but it is commercially shabby and unfair to call perfumes thus obtained by such delightful names as "oil of pears," "oil of apples," "oil of pine-apples," "oil of grapes," "oil of cognac," "oil of bitter almonds," "eau de millefleurs." Blue dyes are made from scraps of tin, old woollen rags, and the parings of horses' hoofs. Old iron hoops are employed in ink-making; bones as a source of phosphorus for tipping Congreve matches; the dregs of port wine for making Seidlitz powders; the washings of coal-tar for producing a flavoring condiment for *blanc-mange*. Old woollen rags are the foundation of the prosperity of a certain class of manufacturers: these musty, fusty, dusty, frouzy fragments being ground up into shoddy and mungo. Other relics of old woollen garments are made to yield flock for wall-paper, padding for mattresses, and Prussian-blue for the color-makers. Chemicals are employed to destroy the cotton fibres in old worn-out balzarines, orleans, coburgs, and other mixed fabrics for ladies' dresses, and to liberate the woollen or worsted fibres for a new career of usefulness. Woollen rags, when even the shoddy-maker will have nothing to do with them, are choice materials for the farmer as manure. That bones are used for knife-handles we know very well; but it appears they are also used for bone-black by color and varnish makers; for size by dyers and cloth-finishers, and for manure by farmers. Horns and hoofs are a very magazine of useful products in the hands of the scientific chemist. Whalebone cuttings yield Prussian-blue; dogs' fat is (shamefully) made into sham cod-liver oil; wool-scourers' waste and washings reappear as beautiful stearine candles; bullocks' blood is used in refining sugar, in making animal charcoal, and in Turkey-red dyeing; ox-gall or bile is used by wool-scourers and by color-makers; fishes' eyes are used for buds in artificial flowers; bladders and intestines are made into air-tight coverings and into musical strings; all the odds and ends of leather and parchment dressing are grist to the gluemaker; calves' and sheeps' feet yield an oil which is doctored up most fragrantly by the perfumer; stinking fish is always welcome as manure to the farmer; and a brown dye is extracted from those small bedroom acquaintances whom few of us like to talk about, and none like to see or to feel. At least fifty thousand tons of cotton-waste, the residue and sweepings of the mills, are annually utilized, by being worked up into coarse sheeting, bed-covers, papier-mâché, and the commonest kinds of printing-paper. Seaweed is used as a material for paper, as a lining material for ceilings and walls, and as a source whence the chemist can obtain iodine. Various kinds of seed, when the oil has been squeezed out of them, are useful cattle-fatteners as oil-cake. Grape husks yield a beautiful black for choice kinds of ink; raisin stalks constitute a capital clarifying agent for vinegar; bran or corn refuse is valuable in tanning, calico-printing, and tin-plate making; brewers' and distillers' grains are fattening food for cattle. Bread-raspings are in France sometimes used as a substitute for coffee, and as a tooth-powder. Tan-pit refuse is valuable for the gardener's hothouse. Damaged potatoes, and rice and grain, are made to yield starch. Ground horse-chestnuts are not unknown to the makers of cheap maccaroni and vermicelli. Cork cuttings and scraps are eagerly sought for stuffing and for buoyant purposes. Pea-shells are used as a food for milch cows, and spirit may be distilled from

them. Sawdust is now applied in a prodigious number of ways, for making paper, distilling oxalic acid, smoking fish, clearing jewellery, filling scent-bags, stuffing dolls, etc. Tobacco-ashes are made into tooth-powder. The coal-tar from gas-works is made to yield sulphate of ammonia, sal-ammoniac, printers' ink, lampblack, disinfectants, naphtha, benzole, paraffin, and the magnificent series of aniline colors for dyeing and calico-printing. The sediment in wine-casks is made into cream of tartar. Old kicked-off horse-shoe nails yield the best of all iron for musket-barrels. As for the shops in which gold-workers, jewellers, and goldbeaters work, not only is the very dust on the floor precious, but a refiner will gladly give a new waistcoat or apron for an old one, for the sake of the particles thereby obtained.

Horse-flesh is certainly not waste so long as dogs and cats eagerly feed upon it; but the French say that we ought not to leave it to the dogs and cats, by reason of the excellent qualities it possesses for human food; however, we must leave this matter to the hippophagic admirers of "chevaline." Fish are applied to many more useful purposes than was customary a few years ago: shark fins are prized as food by the Chinese; shark liver is boiled down by them for oil; shark skin is dried and used for polishing wood and ivory; dried shark heads are given by the Norwegians to cattle as food; smoked and dried dog-fish is eaten as food, as are also the eggs, while the skin and the liver are applied to the same purposes as those of the shark. The French procure useful medicinal oil from the liver of the skate, which used to be thrown away, but which is now found to be nearly as efficacious as cod-liver oil. A French firm make large quantities of useful tallow or fat out of the pickings and waste of slaughter-houses, the dead cats and dogs found floating in the Seine, and the used-up grease of railway wheels; when doctored by means of steam and hydraulic pressure, this fat becomes available for stearine manufacturers. Leather scraps are made into "shoddy leather," by grinding and macerating them into a pulp available for the inner soles of shoes and such-like purposes. There is another leathery composition much used, under the name of "pancake." Thin bits of leather, the odds and ends cut off by the tanner and currier from whole hides, are interlaid with paste until they accumulate to an inch in thickness, and then heavily squeezed between two iron rollers; the mass comes out as an oblong pancake twelve inches by four, and half an inch thick, looking very much "like a cross between a sheet of gingerbread and a cake of tobacco;" it is used for inner soles, heels, and stiffeners. The albumenized paper used by photographers is subject to much waste in its manufacture; this waste, instead of being consigned to the pulp-vat, is now converted into beautiful marbled paper, by a peculiar application of aniline colors to the albumen.

We are told that the using up of what was formerly considered waste, in the textile manufactures, now reaches the enormous quantity of a hundred thousand tons annually, in the three forms of cotton, flax, and hemp waste. If we include animal fibres, such as shoddy wool and silk waste, the aggregate becomes largely increased. The French make firewood or firelighters of the cones of pine-trees and the waste cobs of maize or Indian corn, saturated with any cheap resinous substance. Messrs. Souffrie buy all the waste and pickings of vegetables from the twenty-five hospitals of Paris, cook them by steam, and feed a piggery of seven hundred head of swine—the vegetables being enriched with the greasy slops from the same hospitals. The same firm also produce beautiful white fat from the black residue left after purifying colza or rape oil; and another residue from the treatment of *this* residue gives them a useful varnish for cheap out-door purposes. The oil retained in olive oil-cake is now extracted by chemical means, and converted into capital stearine; and by this improvement it is expected that seven million

pounds of olive oil, now annually wasted at Marseilles, will be utilized. Old account-books, letters, invoices, envelopes, checks, insurance-policies, and other kinds of paper, are now bought and worked up with other materials into pulp for the newspapers. Besides linen and cotton rags, cotton-waste, old writing-paper, straw, and esparto, or Spanish grass, wood is also now much used for making into paper. Large factories for this purpose have been established in this, and other countries; the wood is rubbed down into dust by friction against rapidly revolving roughened wheels, and then treated by chemical processes until it forms a pulp suitable for paper-making. There is one wood-pulp paper-mill in Pennsylvania that can work up thirty thousand pounds of wood or of sawdust per day. Nearly all the newspapers now have a percentage of wood in the paper on which they are printed. A New York daily is said to be printed on paper made of bamboo; and other journals are printed on paper made chiefly of a kind of wild cane that is found in vast abundance on the shores of the Mississippi.

A German chemist has found a mode of distilling spirit out of a residue left after chemically treating wood-pulp for paper. A French manufacturer converts sawdust, by intense pressure, into beautiful little boxes and other ornamental articles. The seed in the cotton pods or tufts, which used to be an annoyance to the cultivators, is now most usefully employed as a gas-fuel, as a source of oil for lamps, as a chief substitute for olive oil, as oil-cake for cattle-food, and as a source of good hard grease or stearine for soap and candles. The refuse molasses from beet-root sugar, formerly used only as pig-food, are now distilled to obtain alcohol, and the residue crystallized to obtain potassium salts. Spent dye-woods, after the coloring matter has been extracted from them, are sold in France to a large manufacturer, who mixes them with tar refuse, and forms them into compressed cakes for fuel, which has a very large sale. The acicular leaflets of the pine-tree are converted into what is called tree-wool, in France, Sweden, Holland, and other parts of the continent; this wool is used for wadding, stuffing for mattresses, and other articles of furniture; a cloth made from its fibres is used for inner vests, drawers, hose, shirts, coverlets, and chest-preservers; the membranous fragments and refuse are compressed into blocks for fuel; the resinous matter contained in them is distilled for gas; while by various modes of treatment there are produced an essential oil for rheumatism and skin diseases, an ethereal oil useful as a curative agent and as a solvent, and a liquid for a medicated bath — all useful substances, from a material which not long ago was utterly disregarded.

Near Charleroi, Belgium, eight hundred thousand tons of coal-dust had accumulated, a burden to the colliery owners, and an injury to the health of the workpeople. Whereupon a Company was formed expressly to utilize this refuse. The coal-dust is sifted, mixed with eight per cent. of coal-tar, heated to a paste by steam at a temperature of three hundred degrees, and pressed into blocks and cylinders about twenty pounds weight. These blocks form excellent fuel for locomotives and steamboats, productive of great heat and very little ash. In various foreign countries where paving-stone is scarce, the slag from iron furnaces is brought into use, by being run into pits eight or nine feet in diameter, and cooled into slabs for paving. The cuttings of tin-plate, and worn-out tin kettles and saucepans, are subjected to processes which yield pure tin, good weldable iron, ammonia, Prussian-blue, and stannate of sodium; and as the make of tin-plate amounts to more than half a million tons annually, there must be a very large store of material available in the old tin-plate which is replaced by the new. The waste flux, such as borax, used in galvanizing metals, finds a ready market among refiners, and for making paint.

But there are mounds of things still waiting to be utilized, waiting for the day when some clear, practical minds will find out what to do with them.

VINEGAR.

OF all the vegetable acids (and they may be numbered by hundreds), none takes equal rank for general importance with vinegar. The extensive use to which we apply it in our everyday life, vinegar from the cruet as a simple condiment, as a liquid for pickling, and for salad dressings, would teach us, if we did not know already, the extreme utility of vinegar for domestic purposes. If, passing beyond the region of our hearths and homes, we wander to the domains of manufacture, then vinegar, or what amounts nearly to the same thing, but not *quite* the same, acetic acid, will be found to have extensive applications. Thus, for example, calico printers use an immense quantity of it in various ways; so, in like manner, do the dyers. Acetic acid and vinegar are almost the same, though not quite the same, as was just now stated. The difference admits of being succinctly explained. Whereas acetic acid is the sour principle of vinegar alone, vinegar is a mixture of the sour principle with another thing or other things that impart special flavor. Almost every one knows, for example, that French cruet vinegar has a distinctive taste, whereby it is easily known from English cruet vinegar, the reason being that whereas French vinegar is the product of a fermentation of wine, English vinegar is the product of certain other things, wine not being one. What the precise things are used in the manufacture of English cruet vinegar I shall not now stop to explain. Hereafter they will come prominently under consideration. Whatever thing holds sugar as a constituent, may be made to yield vinegar; and if out of vinegar, no matter how or whence obtained, we extract the sour portion, leaving all else behind, then the sour reduct is properly called acetic acid. I have said that whatever thing holds sugar, as a constituent, may be made to yield vinegar, and indeed whenever fermentation is had recourse to for manufacturing vinegar it is sugar from which the acid originally comes; not only sugar, but one particular sort of sugar—that known to chemists as grape sugar, or glucose. This statement at first seems inconsistent with the fact that if we dissolve ordinary or cane sugar in water, add a little ferment, and expose the whole for some days to a moderate temperature, vinegar is in the end developed. Chemistry teaches us that the result is not so simple as it appears, the fact being that our ordinary or cane sugar first changes to grape sugar, this next to alcohol, or intoxicating spirit, and the latter to acetic acid. As the fermentation of saccharine, or else alcoholic bodies, was the most ancient source of acetic acid, so it still remains the chief. The distillation of wood is another means of acetic acid production. Originally the term pyroligneous acid was applied to acetic acid obtained from this source, but early in the present century its identity with acetic acid was established. Besides these two sources of fermentation, and wood distillation, chemists are able to produce acetic acid by certain refined processes of their own; these, however, have no commercial value.

Acetic acid has much antiquarian and chemical interest. Familiar to man from the most ancient times, it has ever been appreciated for its condimentary value. Mixed with water, it was much used as a drink by ancient Roman soldiers. A prejudice, but seemingly unfounded, lies against vinegar in this country as a drink. Vinegar and water would appear to be a wholly unobjectionable beverage, and moreover agreeable. To illustrate the chemical interest attached to acetic acid, let us just contemplate the following. Notwithstanding acetic acid, more or less colored and flavored — in other words, vinegar — is evolved from vegetable matters as a result of fermentation, yet its presence in original vegetable matters is most rare. Thus some grapes are sweet and some grapes are sour, but whenever the problem is to evolve vinegar from grape juice, a chemist well knows he must use the

sweet ones. The sourness of sour grapes does not depend on acetic acid — or the sour element of vinegar — at all, but mostly on the presence of tartaric acid. The simplest proof is, that whereas the sour part of vinegar can be distilled over, constituting distilled vinegar, the sour part of sour grape-juice cannot. Sometimes we may have heard expatiated upon as a curious fact that sugar should be capable of yielding vinegar. Very slight chemical study explains the wonder, or rather sets it aside as being no wonder at all, when we reflect that both sugar and acetic acid are made up of the same elements — carbon, hydrogen, and oxygen, only in different proportions. The fact is not so popularly known — if it were, the wonder would seem greater than in the last case — that oxalic acid is also a derivative from sugar, or now more usually from sawdust, the chemical constitution of which last is almost identical with that of grape sugar.

In the cider districts, excellent vinegar is prepared by the acetous fermentation of cider. If, instead of cider, beer be taken, and acetous fermentation induced by proper means, beer vinegar results, the flavor of which is not so agreeable as in the first case, because the flavoring matters of beer itself are less agreeable than those of cider. The colored vinegar of commerce is made in a different way, the fundamental principle still holding good that either sugar or alcohol, a derivative from sugar, must be taken to begin with. The vinegar makers operate upon malt wort — that is to say, unfermented beer, without hops, to develop their vinegar, and using common rasins to impart an agreeable flavor. Traces of oil of vitriol are almost always discoverable in ordinary colored vinegar, on the addition of proper tests. About twenty years ago, a curious, and, to first semblance, an alarming discussion took place relative to the presence of arsenic in certain specimens of vinegar. Undoubtedly, many specimens of oil of vitriol do hold arsenic, and if such be used for mingling with vinegar, then of necessity the mingled vinegar must contain arsenic within the meaning of chemistry. Undoubtedly adulteration is a very bad thing, but still undoubtedly the word adulteration has been too frequently used as a cry of terror by two different classes of persons, one well aware of the mere shadows of things chemical analysis is capable of revealing, the other not so aware — men to whom a mere name is all in all — to whom the word arsenic, whether referring to a ghost, so to speak, of the ten-millionth part of a grain of arsenic or an ounce of the same, would convey the same idea. We need not be afraid of such ghosts of arsenic as may be revealed in certain specimens of vinegar, nearly so much as of the lead and the copper which may be present, never purposely or by adulteration, but as the result of accident. When I say that copper never exists in vinegar as a purposely added contamination, we must of course exclude certain green pickles, and restrict ourselves to vinegar alone, as from the cruet.

Though considerable quantities of vinegar have been made from time immemorial from cider and beer, and made domestically without any sort of mystery, yet the special vinegar manufacture from wort was long held in secrecy. So valuable was the concealment in the estimation of vinegar-makers, that the workmen employed were sworn not to divulge what they knew. The progress of chemistry has terminated this state of things; the general principles that must guide the manufacturer are quite well understood; points of detail there may indeed be, as in all manufactures there are, but here, as in other similar cases, science has unshrouded special trade secrets.

The production of vinegar by fermentation involves, as all know fermentations do involve, the development of low forms of organic life. Whenever wine, beer, cider, etc., change to vinegar, a thick, ropy, gelatinous-looking mass, commonly known as mother of vinegar, forms in the liquid. This "mother" has the property of setting up and accelerating the acetous fermentation in suitable fluids, which, but for the presence of this substance,

would have had to wait a long time. For an explanation of the nature of this mother of vinegar, science is indebted to the microscopists. The glairy mass is a vegetable growth, a vegetable of low vitality, to which the appellation *Mycroderma aceti* has been given. Being developed, it floats on the surface of the liquid, first absorbing atmospheric oxygen, then giving it up to the alcohol, which, owing to this accession, is converted into acetic acid. This is a convenient opportunity for stating some particulars about fermentation in general. The decompositions thus designated are very dissimilar to ordinary chemical decompositions, and until within the last twenty years their general nature was wholly misapprehended. Many organic bodies are capable of fermentation of one or other kind, when brought into the presence of certain complicated bodies called ferments; thus arise many products differing according to the nature of the substance acted upon and the ferment used. The agency of some living organism, however, animal or vegetable, as already explained, is always necessary in every case of fermentation. Thus we have our ferment yeast, which sets up the spirituous fermentation, another which generates the lactic fermentation, a third the acetous. Most of the ferments are vegetables, but one, at least,—that causing the butyric fermentation,—is an animal, and this, wonderful to relate, cannot live in free oxygen, the gas which, breathed by ourselves and the higher animals, alone supports vitality, but thrives in an atmosphere of hydrogen.

The pure, undiluted, unmixed, sour principle of vinegar,—acetid acid, that is to say,—is seldom met with out of chemical laboratories, and is not always to be found there. Pure acetic acid is a transparent crystalline, solid at low temperature, almost as destructive to the skin as so much oil of vitriol or aquafortis would be. The nearest approach to actual acetic acid with which non-professional people make acquaintance is aromatic vinegar, a fluid which may be considered as acetic acid nearly deprived of water, and charged with agreeable odorous matters.

Vinegar being a liquid in such common domestic use, and coming necessarily in contact with ordinary household surfaces, it becomes a question of importance to decide what materials are dissolved by it, and what are not dissolved; further, whether the solutions thus resulting are poisonous or innocuous. Upon lead and copper, vinegar, whether colored or colorless, and in all conditions of strength, acts with rapidity, forming a sweet result called on that account sugar of lead, a compound highly poisonous to man and animals, though it has been stated spiders eat it with impunity, and seeming relish. The lead contamination of vinegar is all the more dangerous that its taste is not disagreeable, and being colorless, is not manifest to the eye without testing. Copper is another metal upon which vinegar speedily acts, generating acetate of copper, or verdigris, a substance of green hue, and violently poisonous. Upon iron, vinegar acts, forming acetate of iron, a compound which, for the small quantities possible to be swallowed, may be considered innocuous. The taste, however, is offensive, as need hardly be impressed upon any one who, having dabbled about a sour salad with an iron knife or fork, and afterwards eaten the salad, can testify. Even the natural juices of salad-making vegetables dissolve so perceptible an amount of iron, that folks particular as to the flavor of their salad never cut their herbs, but pull them to pieces with finger and thumb. Imitation silver forks are also easily attacked by vinegar; indeed, if we pass in review the domestic metals, silver will be found the only one that is not so attacked. I even know a manufacturer who, producing distilled vinegar on the large scale, uses a silver still head and refrigerator for his trade purposes. If a polished iron surface, such as a knife-blade, be immersed for a few minutes in vinegar which holds copper, dissolved metallic copper will be deposited; and if hartshorn be added to another portion of the copper-

contaminated vinegar, until the whole of the acid has been neutralized, and the smell of hartshorn is perceptible, a beautiful blue tint will also reveal the presence of copper. If the addition to a suspected vinegar of sulphurated hydrogen water produce blackness, the presence of either lead or copper, but not iron, is demonstrated. If the further addition of ammonia produces blackness, then the contaminating metal is neither lead nor copper, but iron.

From Leisure Hour.

THE RAVEN.

WE have all heard of Dickens's two ravens, towards whom he showed so much fondness that Douglas Jerrold said jocosely, he was raven mad. One of his pets, he tells us, had "good gifts," but nevertheless lost his life by the "youthful indiscretion" of eating "a pound or two of white lead." Alas! it is just what a juvenile ravenous raven would do; for he is a glutton like his parents, without their cunning. The second raven, Dickens says, "new-pointed the greater part of the garden-wall by digging out the mortar, broke countless squares of glass by scraping away the putty all round the frames, and tore up and swallowed, in splinters, the greater part of a wooden staircase of six steps and a landing—but after some three years he too was taken ill, and died before the kitchen fire. He kept his eye to the last upon the meat as it roasted, and suddenly turned over on his back, with a sepulchral cry of 'Cuckoo!'" Since then, adds Dickens mournfully, I've been ravenless. The great author himself is now silent in death, but his affection towards all living creatures, "man and bird and beast," still lives and endears his memory to many thousands of mankind; for in this respect, like his own Barnaby, "he was known to every bird and beast about the place, and had a name for every one of them." But we are reminded also, when we look upon the raven, of Southey, Byron, Longfellow, and Poe, who have told us something of the pranks, virtuous and vicious, of this clever bird; and of Goldsmith also, who says he "heard a raven sing the 'Black Joke' with great distinctness, truth, and humor." There can be no doubt about the linguistic powers of our hero throughout all ages, for he is at the head of talking birds. One of his ancient ancestors, tired of the monotony of the temple of Castor, gravely entered a tailor's shop, and remained there apparently only to amuse himself by pronouncing aloud to gaping Romans the names of the Emperor Tiberius and the Royal Family. He was rewarded after death by a magnificent interment. Another, addicted to peeping and listening from the porch of a chapel during divine service, heard the minister say repeatedly, "Let us pray." On the occasion of a tea-party at the Squire's Hall, this animal was brought into the drawing-room to amuse the assembled company with his tricks. Set down, he looked about him, nothing abashed. Presently kenning an old well-known antiquary, clad in a dark snuff-colored suit, whose head and shoulders only were visible over the top of a high-backed chair, on which the worthy man happened at that very moment to be kneeling, our sable hero, assuming a solemn attitude, gave out slowly, and in pulpit tones, "Let us pray!" Another, who set up his abode at a posting-house in Yorkshire, guarded the yard with the fidelity of a watch dog, and upon the arrival of a traveller invariably demanded with a loud voice, "Ostler, come and take the gentleman's horse!" Another, long accustomed to ramble about a nobleman's park in Wiltshire (Marquis of Ailesbury's), when surrounded by a crowd of unwelcome rooks and crows, would 'cutely lift up his head, and imitating the voice of a man, shout out, "Holloa!" and the consternation of his affrighted companions, who took flight instantly, seemed to give him infinite merriment. Another, called the "Par-

son," lived in a stable, and observed that when the groom tickled his favorite horse behind the shoulder, the hind legs of the horse would go up, and the groom would frequently say to the playful animal, "Ha, Jack; go it, old fellow!" One day the groom heard capers and noise in the stable, and approaching the door was astonished by the sound of his own voice inside — "Ha, Jack; go it, old fellow!" Upon entering the stable he found the raven perched on the horse's hind quarters, pulling hairs out of Jack's tail, and responding regularly to the horse's kicks with the groom's exclamation, "Ha, Jack; go it, old fellow!"

National Education. — Our educational policy is rather that of clever clerks, than of great statesmen, in the framing of our plans. We accordingly aim at and secure immediate and small results in our educational system, but disregard the accomplishment of distant and really important effects. On the Continent of Europe, they manage these matters much better both as regards principle and practice. In several countries which we regard as much less civilized than our own, and whose resources are considerably below ours, real civilization and education have made, and also maintained, much greater progress, simply because the different elements of civilization are each availed of, instead of merely one or two of them being resorted to. Libraries, and museums, and galleries of works of art, are established throughout the country, not only in the capital cities, but in the various provincial towns, by means of which the people are stimulated to follow up the education they have commenced at school, and are induced to complete it by resorting to those institutions; and not, as is too much the case with the people of this country, to consider their education as complete by merely learning to read, write, etc., and that it is of no use to them after they have left school.

Or if, instead of referring to the educational systems adopted in other countries, we examine the systems pursued by our schools for the higher classes, and our universities, we shall there find that, instead of the pupils being merely taught the rudiments of education, they are stimulated to follow it up by resort to libraries, and museums, and galleries of works of art; in addition to which their school and university education serves but as a preparation for the duties and professions in which they are about to engage, and hence they are not only induced, but necessitated, to retain and follow up their acquirements. In the case of poor persons, whose primary education is not immediately connected with their duties in after life, it is much more essential that some stimulus should be supplied to induce them to complete it, and not to neglect what they have already learnt. This essential stimulus, however, in their case, we wholly neglect to supply.

It is not sufficient to teach merely the elements, as we now do, but this teaching must be followed up and completed by supplying food to the appetite we have stimulated. We should not only furnish tools for working, but materials on which to work, if we expect any salutary product to be the result of our teaching.

Buchan's Domestic Medicine. — The *Domestic Medicine* was written in Sheffield; and James Montgomery, in his "Memoirs," says: "I remember seeing the old gentleman when I first went to London. He was of venerable aspect, neat in his dress, his hair tied behind with a large black ribbon, and a gold-headed cane in his hand, quite realizing my idea of an Esculapian dignitary." Montgomery never spoke to the doctor, but looked upon him with respect as a man who had *published a book*. Buchan's "Medicine" has had its day; and whatever may be its merits, it had its shortcomings. In one of the Scottish editions there was an astonishing misprint, in which a prescription containing one hundred ounces of laudanum, instead of that number of drops, is recommended.

THE SPECTROSCOPE.

II.

THE principal result and conclusions at which I have arrived, says Father Sécchi, are these:

"1st. All the stars, in relation to their spectra, can be divided into four groups, for each of which the type of spectrum is quite different. The first type, represented by the star Sirius, and Vega, or *α* Lyræ, and by all the white stars. The spectra of all these stars consist of an almost uniform prismatic series of colors, interrupted only by four very strong black lines. Of these black lines, the one in the red is coincident with the solar line C of Fraunhofer; another in the blue coincides with the line F; the other two are also in the sun's spectrum, but they have no prominent place. These lines all belong to hydrogen gas; and the coincidence of these four black lines with those of the gas has been already proved by careful experiments by Mr. Huggins, and also lately by myself. Mr. Huggins, however, finds a little difference in the spectrum of Sirius, for which we may account in another way. Stars of the first type are very numerous, and embrace almost half of the visible stars of the heavens.

"The second type is that of the yellow stars, as Capella, Pollux, Arcturus, Aldebaran, etc. These stars have a spectrum exactly like that of our sun — that is, distinguished by very fine and numerous lines. These stars give occasionally a continuous spectrum, when the state of the atmosphere is not good; but, in general, the lines may be distinguished very easily. A fuller description is unnecessary, since the spectrum of the sun is very well known. The only thing which deserves particular attention is, that in this class occasionally the magnesium lines are very strong, so as to produce very strong bands, and the iron lines in the green are in some very distinct. These stars can be distinguished even without a prism, by the difference of color — a rich yellow — which contrasts strongly with the first type. Stars of this second type are very numerous, and embrace almost the other half of the stars.

"The third and very remarkable type is that of orange or reddish stars. These have as a prototype the stars *α* Herculis, *α* Orionis, Antares, *o* Ceti, *B* Pegasi. The spectra of these stars show a row of columns, at least eight in number, which are formed by strong luminous bands alternating with darker ones, so arranged as to represent, apparently, a series of round pillars, closely resembling a colonnade. *α* Herculis is exceedingly remarkable in this respect; the other stars are more or less clearly divided into pillars; but it is quite impossible to describe the beauty of the appearance which is visible in a telescope on a fine night."

All the pillars are generally resolved more or less completely in different stars into smaller and finer lines, very sharp and clear. In these stars he discovered sodium, magnesium, and hydrogen.

The fourth type is not less remarkable, being stars of a red color, some of which are very small, and none of them exceeding the sixth magnitude. The spectrum of this type consists of three large bands of light, which alternate with dark spaces so distributed as to have the most luminous side towards the violet.

Father Secchi does not attempt to fix the nature of the substances composing this type, as he had not made a sufficient number of comparative measurements; but he states that we are authorized in supposing these stars to be still in a different condition from others, perhaps partly in the gaseous state, or at least, surrounded by a very large atmosphere, different certainly from the others.

The most striking object for its singularity which he met in the examination of the heavens, is a star in Cassiopiæ, in the spectrum of which he observed the lines of hydrogen in a luminous state, exactly the reverse of the dark lines of the stars of the first type. We have, therefore, he says, without doubt, a grand fact, the fundamental distinction between the stars according to a small number of types. This opens a field for very many important cosmological speculations.

Mr. Huggins, F. R. S., and Dr. W. A. Miller, Vice-President of the Royal Society of London, have conjointly devoted much attention to the investigation of the spectra of the terrestrial elements, fixed stars, comets, and nebulæ. In the star Aldebaran, the light of which is of a pale red, on comparing its spectrum with the spectra of sixteen of the terrestrial elements, they found, in the spectrum of the star, lines corresponding to lines in nine out of the sixteen elements. The elements which they found in the star are sodium, magnesium, hydrogen, calcium, iron, bismuth, tellurium, antimony, and mercury. Seven other elements were compared with the star, viz.: nitrogen, cobalt, tin, lead, cadmium, lithium, and barium; but no coincidence was observed in any of these. As there are sixty-four terrestrial elements altogether now known, of course it is possible that, if the spectra of the remaining number had been compared with the spectrum of the star Aldebaran, other coincidences of the spectral lines would have been observed.

On comparing the spectrum of the star *a* Orionis with the spectra of the sixteen elementary bodies just mentioned, coincidences were observed in five — viz.: sodium, magnesium, calcium, iron, and bismuth. In the spectra of *a* Orionis and *B* Pegasi, which closely resemble each other, the lines corresponding to those of hydrogen were wanting. The absence of the hydrogen lines is very remarkable, inasmuch as they are highly characteristic of the solar spectrum, and the spectra of by far the larger number of the fixed stars to which the observations of Huggins and Miller have extended. "We hardly venture," they state, "to suggest that the planets which may surround these suns (*a* Orionis, and *B* Pegasi) probably resemble them in not possessing the important element hydrogen. To what forms of life could such planets be adapted? Worlds without water! A power of imagination like that possessed by Dante would be needed to people such planets with living creatures."

Since the spectroscope came into use there have not been many opportunities of observing the spectra of comets. M. Donati, of Florence, found that the spectrum of a comet visible in the year 1864, consisted of bright lines. In the year 1866, Mr. Huggins examined the spectrum of a faint comet. This spectrum was composed of two spectra — one of which was a faint continuous spectrum of the coma, indicating that it was visible by the reflected light of the sun; and the other of the nucleus, showing that it was self-luminous. The comet of 1867 was also very faint, and gave a compound spectrum similar to that of the comet of 1866.

During the summer of 1868, two comets appeared, rather brighter than the former; one of which was called Brorsen's comet, the other a comet discovered by Winnecke. The spectra of these two comets consisted of three bright bands, in similar, but not identical, parts of the spectrum. The first band occurs about half-way from D to E, of the solar spectrum; the second begins near *b*, and extends nearly to F; the third band presents itself between F and G.

Mr. Huggins and Dr. Miller jointly compared the spectra of these comets with the spectrum of olefiant gas (chiefly composed of carbon), and found that in every particular of refrangibility and relative intensity the spectra of the two comets were similar to that of carbon.

Whilst Huggins and Miller were making this discovery, an independent discovery of the same kind had been made by Father Secchi at Rome, and communicated by him to the French Academy.

Regarding the spectra of the nebulæ, it may be observed that, from the time these heavenly bodies were first discovered, mankind have wondered at them, and were curious to know their constitution and habits. A doubt existed whether many of them were really gaseous substances, as their name and general appearance indicated, or whether they were simply clusters of stars seen at too great a distance to be resolved by the most powerful telescopes. By means of Lord Rosse's telescope, about half of the nebulæ that give a continuous spectrum have been resolved into separate stars, while about one-third more are probably resolvable. In a paper by Mr. Huggins, in the "Philosophical Transactions of the Royal Society of London" for the year 1868, it is stated that up to that time he had determined satisfactorily the general character of the spectra of about seventy nebulæ, which form but a part of a much larger list he had examined; but, in the case of many of these, their light was found too feeble for satisfactory analysis. Of the seventy nebulæ, about one-third give a spectrum of bright lines, indicating that they are of gaseous composition. All the differences observed between the spectra of the gaseous nebulæ may be regarded as modifications only of the typical spectrum. So far as the nebulæ have been examined, the brightest of the three lines — which agrees in position in the spectrum with the brightest of the lines in the spectrum nitrogen — is present in all the nebulæ which give a spectrum indicative of gaseity. As nitrogen is one of the constituent elements of the earth's atmosphere, and of many kinds of food which we daily use, it is an interesting fact to know that in the far-off gaseous nebulæ the same substance exists.

Father Secchi examined the spectra of several nebulæ, and found in many of them the Fraunhofer line F, corresponding to a line of hydrogen; and he states that a difficulty arose in his mind on the subject. He asked himself, "How can it be that, while hydrogen gas has so fine and rich a spectrum, we do not see in the spectrum of the nebulæ anything except the single line?" In order to satisfy himself on this question, he undertook a kind of photometrical measurement of the intensity of luminosity of the different lines which constitute the spectrum of hydrogen; the result of which was that, in diminishing the light by an absorbing screen and simple reflections, we could reduce the spectrum to the single line F, as we see it in the nebulæ. Even hydrogen, burning at the ordinary temperature, has not given any line but this after reflection. This difficulty is, therefore, completely removed, he states; being only a question of intensity of light. Hence it appears that hydrogen, which is one of the principal elements of water and of most terrestrial substances, exists in the remote nebulæ.

With regard to the nature of variable stars — that is, stars which burst out with sudden brilliancy, and then as suddenly wane — a sort of flash-in-the-pan of the

distant heavens. One of these variable stars was observed on the 12th of May, 1866, by Mr. John Birmingham, of Tuam, in the constellation of the Crown. Mr. Birmingham communicated the fact to Mr. Huggins, who examined this remarkable object with the spectroscope. The spectrum of this heavenly flash-in-the-pan differed from that of any other celestial object which Mr. Huggins and Dr. Miller had examined. In fact it formed a compound spectrum, or, rather, two spectra superposed — one of which was formed of four bright lines, some of which correspond to hydrogen; the other was like that formed by the sun. The character of the spectrum of this star, taken in connection with its sudden outburst in brightness, and its rapid decline, suggested the startling speculation that, in consequence of some vast convulsion taking place, the star became suddenly wrapped in the intense flames of burning hydrogen.

Mr. Airey, the Astronomer Royal, observed this remarkable star on the night of the 17th of May, 1866, and determined its right ascension to be 15 *hours*, 53 *min.*, 56 *sec.*, .08, and north polar distance 63 *deg.*, 41 *min.*, 53 *sec.*; agreeing, he states, precisely in position with a small star of the 9.5 magnitude, numbered 2765 in Argelander's catalogue. In a period of a little more than a week it increased in brilliancy equal to that of the third magnitude, and declined as rapidly to its normal condition between the ninth and tenth magnitudes.

For about thirty years previous to 1868, the red prominences observed during total eclipses of the sun led to much speculation. The scientific world had been divided in opinion as to whether the prominences or protuberances, as they are indifferently called, belonged to the sun, the moon, or were caused by refraction, etc. During the total eclipse of the sun which occurred on the 18th of August, 1868, these different opinions were completely reconciled, and forever set at rest, by means of the spectroscope. It was ascertained that the prominences chiefly consist of hydrogen gas in a state of intense ignition. Some of these flaming prominences attain an enormous height above the general surface of the sun. Sir John Herschel states, in his "Treatise on Astronomy" (edition of 1869), that one prominence reached the amazing height of forty-eight thousand miles above the sun's general surface.

Several expeditions were sent to different places along the line of totality of the eclipse to take observations. One of the French expeditions was in charge of M. Janssen, who fixed his place of observation at Guntoor, India. M. Janssen was provided with excellent spectroscopic apparatus, and, to his honor, made excellent use of it. In his communication to the French Academy, he sums up his observations of the phenomena in the following words:

1. "That the luminous prominences observed during total eclipses belong incontestably to the circum-solar regions.

2. "That these bodies are formed of incandescent hydrogen, and that this gas predominates, if it does not form the exclusive composition of them.

3. "That these circum-solar bodies are the seat of movements of which no terrestrial phenomena can give any idea — masses of matter, of which the volume is several hundred times greater than that of the earth, being displaced and completely changing their form in the space of a few minutes."

On the 18th of August, 1868, whilst M. Janssen was observing the sun's prominences, it occurred to him that the prominences might be observed at all times the sun is visible, without an eclipse being necessary. This idea presented itself to him on account of the spectral lines of the prominences being bright, and in contrast with the dark lines in the spectrum of the main solar body. During the night of the 18th, the method and means of carrying out this idea were clearly arranged in his mind. The next morning the sun rose very brightly: he placed the slit of the spectroscope in part on the solar disc, and in part on the prominences; the slit, therefore, gave two spectra — that of the sun, and that of the prominences. In the afternoon he examined the same part examined in the morning, and found that great changes had taken place in the distribution of the matter of the prominences.

On the morning of the 20th of October, 1868, Mr. Norman Lockyer, of London, found that he could observe the spectrum of the prominences at any time the sun was visible. This idea had occurred to him two years previously; but owing to the imperfection of the spectroscope which he used, he had been unable to realize his idea until the date mentioned. A day or two before the 20th, he had received a new and more perfect spectroscope, which enabled him to make the discovery also, without knowing at the time that M. Janssen had two months previously discovered the same thing.

A communication from Mr. Lockyer, sent through Mr. De la Rue, announcing the discovery to the French Academy, reached that body a few minutes before M. Janssen's letter from India announced to the Academy the same discovery.

This remarkable double discovery opens up a field of investigation destined to yield a rich harvest to the husbandman in solar physics.

Turning now from the discoveries made in the heavenly bodies during the last few years to those made in terrestrial substances, the discoveries made in the latter by the spectroscope are scarcely less calculated to excite our astonishment than those in the former.

Bunsen, an eminent German chemist, whilst examining by the spectroscope in 1860, the residue of the mother-liquor from the Durkheim Spring, saw two blue lines in its spectrum, and also two red lines, which he had never seen before, although he had carefully mapped the spectra of all the known elements. The observation of these lines induced him to make a minute chemical examination of the water which furnished them — in fact, he evaporated more than forty tons of the water — and found two new metals, which he called *cæsium* and *rubidium;* the first named from "cæsius," "sky-colored," in allusion to the two characteristic blue lines in its spectrum; the second from "rubidus," signifying "dark red," in allusion to the two red lines in its spectrum. It would have been almost impossible to ascertain their existence in the water in the minute proportion in which they occur — about three grains of chloride of cæsium, and rather less than four grains of chloride of rubidium to every ton of water — but for the method of spectrum analysis. Since these elements were discovered, they have been found in various countries combined with several different substances.

Another new metallic element, called thallium, was discovered, in 1861, by Mr. Wm. Crookes, whilst examining with the spectroscope the seleniferous deposit from the sulphuric acid manufactory at Tilkerode, in the Hartz Mountains. A portion of the deposit, introduced into a blue gas-flame, gave abundant evidence of selenium; but, as the alternate bright and dark bands due to this element became fainter, and he had been expecting the somewhat similar but closer bands of tellurium, suddenly a *bright green line* flashed into view, and as quickly disappeared. An isolated green line in this portion of the spectrum was new to him, although he had become intimately acquainted with the appearance of most of the spectra of the elements. After numerous experiments, he concluded that the green line in the spectrum was caused by a new element.

The delicacy of the test of spectrum analysis for this new element, called *thallium* — from a Greek word, which signifies a "budding twig," in allusion to the bright green line in its spectrum — is so great, that in a solution of sulphate of thallium, containing only 1-5,000,000th part of a grain, the bright green line was detected.

In 1862, M. Lamy discovered thallium in large quantities in Belgian pyrites, without being aware, he states, of Mr. Crookes's previous discovery. Since then it has been found in various places, in combination with different substances, and is now pretty extensively used in the arts, particularly in fireworks.

The new element *indium* — so called in allusion to two lines in its spectrum, one in the blue, the other in the indigo — was discovered, in 1864, by two German professors, Reich and Richter, in zinc works in the Hartz Mountains. This discovery was also made by means of spectrum analysis. Indium is a white malleable metal, the specific gravity of which is 7.36, and is easily fused.

Of the many useful purposes to which the spectroscope has been already applied, not the least important is that of its application to the manufacture of Bessemer steel. In about twenty-five minutes, five tons of iron, containing a surplus quantity of carbon, are converted into steel. The great point to be determined in the process is to ascertain the precise moment when all the carbon is burnt out of the iron. If the process should be continued after the carbon has been all burned out, the whole five tons are spoiled. The only way of determining this critical moment, before the spectroscope came into use, had been the appearance, of the flame above the retort, as it appeared to the eye of a man employed to watch it. This method led to the spoiling of a large quantity of steel. Instead of watching the flame with the naked eye, Professor Lielegg uses the spectroscope to observe the flame at the Bessemer works of the Austrian Southern Railway at Gratz. The spectrum peculiar to the Bessemer flame, which becomes visible at the beginning of the boiling period, and attains its maximum distinctness during the first half of the refining period, is — without regarding the lines produced by the potassium, sodium, and lithium in ignition in the flame — simply the spectrum of burning carbonic oxide. This spectrum contains four groups of lines, the positions of which were accurately determined. About five minutes before the final moment, certain lines appear in the blue space of the spectrum; shortly afterwards a very bright and sharply defined line appears in the violet. As soon as these lines *disappear*, the critical moment has been reached when all the carbon is burnt out.

From the preceding sketch of the marvellous results that have followed the discovery of the Fraunhofer lines in the spectrum, it will be seen that, by its means, four new terrestrial elements have been discovered, and also many terrestrial elements have been discovered in the sun, fixed stars, comets, and nebulæ.

By means of the telescope, man has been already enabled to trace the handiwork of the Creator in the diurnal and orbitual motions of the various bodies in the solar system; to arrive at a correct knowledge of the universal law of gravitation by which these motions are regulated; to measure the distances of the sun and planets from the earth and from each other; to determine their weights, as in a balance; and even to find the distances, and ascertain the weights, of many of the fixed stars. By the acquisition of this knowledge, man

has been enabled to understand and appreciate the truth announced by the Royal Psalmist: "The heavens declare the glory of God and the firmament showeth His handiwork." And if man, by means of the telescope, has been enabled to arrive at this stage of knowledge, may we not reasonably hope that, by means of the spectroscope, he will be able to determine the constituent elements of all the heavenly bodies which send us light, heat, or actinic rays, and the mutual action and reaction of these elements on each other, as well as the — as yet — mysterious molecular relations of the elements of our earth? The spectrum thus becomes a species of illuminated ladder, with one end on the earth, the other in heaven, along the lines, bands, or rounds of which bright ideas are descending and ascending, conveying to us telegrams from the remotest stars and nebulæ, and assuring us that "the statutes of the Lord are just, sought out in all His ways."

DINING WITH A MANDARIN.

AT the confluence of the rivers Yang-Tsze-Kiang and Han, in the province of Hoopeh, three Chinese cities stand within sight of each other, named respectively Hankow, Hanyang, and Wuchang. The first claims attention as being the entrepôt for the black teas prepared in the adjoining Moning districts, and on account of its marking the limit of foreign steam navigation on the Yangtsze permitted by the Imperial government; whilst the second, even including its suburbs, is unimportant. But the third, being the capital of Hoopeh, the residence of the Viceroy, governing both that province and Hounan, and possessing an extensive Confucian temple, fitted with 8,000 cells for the reception of students assembled to undergo the triennial examination, is well worthy of notice. On such an occasion it is dangerous for foreigners to visit Wuchang, as the young literati, partaking somewhat of the boisterous spirits and frolicsome demeanor which are the occasional characteristics of college students at home, are apt to indulge in practical jokes, which, if the visitor resents, usually terminate in a brawl. So well known is this, that it is customary for the foreign Consuls stationed at Hankow, on the opposite side of the river (here about a mile in width), to advertise the date and duration of each examination, and warn their respective countrymen to refrain from visiting Wuchang during their continuance. But it is precisely on such an interesting, though probably dangerous, occasion that the foreigner, bent on the acquisition of information, and especially desirous of an insight into Chinese social life, longs to stroll through the quaint old city, to linger about the shops, and enter the cloistered temple, as at that time a greater volume and variety of Asiatic life is to be met with than during any other period of the intervening three years.

It was, therefore, with a feeling of peculiar satisfaction that we became aware of an invitation to dinner at the house of a high mandarin, just received by our friend the Consul, and accompanied by chairs and bearers to convey us there. Whilst being jolted along by the coolies it may not be out of place to give the reader a few memoranda relative to Chinese food, and how some of it is obtained. As a race the Chinese are voracious, and to the foreigner accustomed to look upon the appeasing of appetite as one of the minor duties of life, the epicurean idiosyncrasies of the wealthy, and the public and obtrusive feeding of the middle and lower classes, appear totally devoid of refinement. Omniverous to a degree, there is not a creature or plant which art or industry can procure, capable of being eaten with safety, that is not used for food — dogs, cats, rats, sea-slugs, sharks' fins, grubs found in the sugar-cane, dried silk-worms, earth-worms, mysterious roots, leaves and tendrils—all are consumed by high or low. The flesh of wild horses is much prized: the larvæ of the sphinx-moth, bears' paws, and other animal extremities are considered delicious; and edible birds' nests, the work of the *Hirundo esculenta*, a swallow which builds only among the steepest precipices in the islands of Malaysia, stand high in importance at a mandarin's dinner; and deservedly so in a pecuniary point of view, as this delicacy costs at the rate of $35 per lb. Sometimes served as an entrée, it is more frequently converted into soup, and brought to table along with another, composed of mare's milk and duck's blood. The species of dog usually cooked is a small, delicate spaniel of dejected appearance, whose demeanor contrasts vividly with the noisy demonstrations of the wild Tartary cats, generally exposed for sale by the same dealer: whilst the rats, large, plump, and by no means repulsive-looking, are brought to market neatly prepared, and skewered ready for roasting. In addition to their ordinary plan of netting fish, the Chinese adopt two other methods which bear the stamp of novelty, and are not recognized by Izaak Walton in his instructions to the disciples of the "gentle art." Probably nowhere else would the idea occur to even the most impecunious fisherman to convert a dead countryman into bait. Sailing along river or canal, the traveller occasion-

ally sees in the dusk of the evening, among the lotus flowers and fringes of reeds which border the streams, four stout coolies vigorously shaking an object over a basket. A nearer approach reveals the unusual sight of a corpse being denuded of the silver eels which have collected in it during the day. Where those exquisite and beautiful fish abound, the fishermen are on the alert to detain any remnant of mortality floating along, by tying it to a stake. Nightly, the shaking of the defunct proceeds, and is continued time after time as long as the remains cling together.

At another point the foreigner has his attention arrested by the appearance of an open punt, with a well in the centre compartment, and perches projecting from the gunwale on the outside. On each perch two fishing cormorants stand side by side, while the fisherman propels the boat by means of an oar over the stern, and has within reach two long bamboos, one with a bag net at the end. At a signal the birds bound into the water and commence immediately to hunt for fish, the boatman meanwhile keeping a wary eye about him, so as to detect and visit with prompt punishment any attempt at surreptitious appropriation. Such vigilance is far from unnecessary, as the cormorant is so voracious, that if not watched, it would endeavor to swallow every fish it caught. As a preventive, each bird has a ligature fastened around its neck during fishing time, so that any unobserved attempt to gorge a creature larger than an eel, would result in speedy strangulation. When a fish is captured, the boatman holds out the bag net, into which the cormorant resigns its prey, usually without hesitation. Sometimes, however, the bird gets sulky, and, lagging behind the others, commences sporting on its own account. Its first capture may be of small girth, and is swallowed with comparative ease. Grown bolder by success, and less under fear of discovery than at first, its next attempt is probably made on a plump grilse — no matter, down it goes; and, of course, like an overgrown chimney-sweep in a flue, the fish sticks at the most critical point. The culprit immediately evinces symptoms of distress; and, flapping its wings on the water, attracts the sharp ear of the fisherman, who, sculling to the spot, lifts bird and prey into the boat, plucks forth the fish, and consigns the feathered thief to punishment by tying its feet to a perch, and depriving it of food for the remainder of the day.

But our chair-bearers at length succeeded in shouting and elbowing their way through the crowded city; and having arrived at San-ko-lin-Sin's mansion, we alighted, and were ushered into a lavatory through a crowd of children; not little Sin-ners, however, as they are the progeny of the domestics, of whom there appears quite a multitude. Lavatory is perhaps scarcely the correct name to give an apartment without a roof, and whose only appointments consist in a caldron of boiling water, on the lid of which, neatly folded, are a dozen or two of crape parti-colored napkins, one of which, after being dipped in the hot liquid and wrung out, is handed to each guest. A hurried rub over the face and temples, then around both hands, completed the ablution, and without the further ceremony of drying with towels, that being left to evaporation, we proceeded to the smoking-room, at the door of which we were received with many bows and polite speeches by the host, and introduced to his friends. Opium and tobacco-pipes were offered, as well as cheroots; but as we declined their indulgence, the way was led into the guest chamber, where we were seated with the strictest regard to the etiquette of rank and precedence. The interior of the apartment is usually of a costly and handsome description, the walls and ceilings being decorated with fret-work and carved designs; the furniture a strange combination of the airy and substantial, the quaint and the picturesque, whilst the numerous articles of vertu standing about, the scroll pictures and gayly painted lanterns depending by silken cords from the grotesquely sculptured beams, present a *coup d'œil* both unique and pleasing. The table is ornamented with a profusion of vases, in which flowers and fragrant perfumes are placed, ample space being left all round for the bowls of the guests. From the time when the host took his seat on the slightly raised platform at one end of the dining table, conversation commenced, and rarely flagged during the four or five hours of the feast. Meanwhile a company of comedians took up a position at one end of the hall, and awaited a signal at the completion of the first few courses, to commence some favorite drama.

The dinner began by a cumbersome ceremonial of drinking a light wine made from rice, possessing somewhat the flavor of sherry. It was served hot, poured from a china kettle into little porcelain cups, and handed by a handsomely dressed boy on bended knee, while another passed round sweet biscuits made from buckwheat. During this preliminary course, the host not only drinks, but eats to each of his guests in succession, observing the strictest etiquette of rotation, and they in the same order to him and to each other, his every movement and gesture being observed, noted and respected. The first course on the present occasion consisted of custards and preserved iced fruits, which was quickly followed by cold relishes, such as salted earth-worms, smoked fish and ham, Japan leather (an article of food possessing a strong and disagreeable taste), and pigeons' eggs, having the shells softened by vinegar.

Gradually the feast became more substantial, and included basins of sharks' fins, birds' nests, deer sinews, and other dishes considered peculiarly nutritious and appetizing. At length the real solids were reached, consisting of rice and curry, chopped bears' paws, mutton and beef cut into small cubes and floating in gravy; pork in various forms; the flesh of puppies and cats boiled in buffalos' milk; shantung, or white cabbage, and sweet potatoes; fowls split open, flattened, and grilled, their livers swimming in hot oil; and cooked eggs of various descriptions, containing embryo birds. But the surprise of the entertainment was to come. On the removal of some of the flower vases, a large, covered, flat dish was placed in the centre of the table, and at a signal the cover was removed. The hospitable board immediately swarmed with juvenile crabs, which made their exodus from the vessel with surprising agility. The crablets had been thrown into vinegar just as the guests sat down, and this treatment being obnoxious to the feelings of the crustaceæ, renders them irritable on escaping from their acid bath. Fast as they ran their sprightly movements were anticipated, and soon checked by each guest seizing the nearest, thrusting it into his mouth, crushing it between his teeth, and swallowing the strange morsel without ceremony. I determined to follow the Chinese example, and for once try a couple of infant crabs, which I found soft and gelatinous, as they are but tiny creatures, not more than a day or two old; but I was compelled to yield at the third. It had evidently resolved on vengeance, and, taking advantage of my want of dexterity in the management of chopsticks, inflicted such a nip upon my lower lip that I relinquished my hold, and desisted from further experiments.

The conversation having been necessarily somewhat interrupted by the episode of the crablets, we leant back in our chairs to watch the comedy, until the *soi* was handed round, a liquor made from a Japan bean, at present much used by the wine-drinkers of Europe, to revive their faded palates. Various kinds of shell and fresh fish followed, succeeded by several thin broths, and concluded by the costly, though insipid birds' nest soup. The table being cleared, a very pretty specimen of the Yuen-ming-yuen porcelain was placed before the host. It consisted of a series of nine dishes (corresponding to the number seated at the board) shaped like a cabbage, and all fitting into one another. The contents were a variety of scorched seeds and nuts, which were nibbled, along with sundry hot wines and tea, amidst a cloud of tobacco smoke, the host considerately procrastinating his usual opium-pipe till a later period.

But the shades of evening warned us not to forget that, however great the hospitality, we were in the midst of a population eminently hostile to foreigners. Bidding adieu, therefore, to San-ko-lin-Sin and his friends, and surrounded by our military guard, each individual soldier of whom looked as if he would like to terminate our career and decorticate our remains, we fortunately reached our boat in safety, and presently landed at Hankow.

Nature.— What a sweet thing, after all, is nature, the other and open book of God. One can make a friend of any of those flowers, and even a humble moss, or a silver lichen, or a purple mollusc, staining the wave-beaten rock, may become familiar and trusted. Nor do they, like most earthly friends, disappoint, and disappear, for their looks and lives are one, and the loveliness they wear, and the fragrance they exhale, and their acts of gentlest ministration of which the tender soul is conscious, are all harmonious, and each of them, whether it weeps with the dews of morning, or basks in the beams of noon, or rests on the bosom of the night, and whispers of an unchanging affection which all its history has acted out, is a "thing of beauty and a joy forever." And when all other pleasures are found to be mirages, God tells us that in every gorgeous form upon the plain, and every star-like spot upon the mountain stone, there are waiting upon us communings of truth, and companionships of peace. And, just as when all other lights are quenched, a voice of Compassion tells us of a glory that can irradiate the grave and reveal the portals of immortality, so the same divine monitor shows us, in the breathings of the summer wind, and in the perfumes of the bursting flowers, and in the splendors of the sunlit skies, that earth after all is not a desert, but only the vestibule of heaven.

REV. CHARLES NAISMITH.

Color-Blindness. — Very few persons are perfect in their color vision. Dr. Wilson, who is an authority on the subject, states that one person in every eighteen is color-blind in some marked degree, and that one in every fifty-five confounds red with green. Any one of this fifty-five must needs be a dangerous person if intrusted with the working of colored signals; accordingly it behooves railway companies to test periodically, through their medical officer, the condition of vision in detecting colors of their operatives, for if color-blindness exists we know education of the eye or treatment will not improve it. We know a gentleman who always recognized light red as violet, and when lightning existed in the atmosphere the flash always assumed a violet hue to him. Men, then, who pace the deck of a steamer on watch, signal-workers and railway guards, should be even above suspicion of being color-blind; for

an obvious reason, and to avoid danger, their efficiency should be properly tested.

THE DUST, ETC., OF SPECIAL ATMOSPHERES. — Dr. Sigerson, in a lecture at the Royal Irish Academy, Dublin, on Microscopic appearances obtained from special atmospheres, explained that in examining the air of factories and work-shops, he found the atmosphere of each charged with particles according to the nature of the trade carried on. In an iron-factory, he found carbon, ash, and iron, the iron being in the form of translucid hollow balls one-two-thousandth of an inch in diameter. In the air of a shirt-factory, filaments of linen and cotton and minute eggs were floating; and in places where grain is thrashed and converted, the floating dust is fibrous and starchy, mingled with vegetable spores; that the dust of a scutching-mill is more hurtful than any, and as much pains should be taken to get rid of it as that of the grinding-mills of Sheffield. In the air of type-foundries and printing-offices, antimony exists; stables show hair and other animal matters; and that the air of dissecting-rooms is particularly horrible. All this is very disagreeable to think of, but while it manifests that we should be careful to purify the air we breathe, it teaches, also, that nature has given us a respiratory apparatus endowed with a large amount of self-protecting function.

NEW METHOD OF PRESERVING MEAT. — At Monte Video, meat is now preserved in large quantities for export, by a process which is thus described. A pickle is made containing 85 per cent. of water, with hydrochloric acid, glycerine, and bisulphite of soda, and in this the meat, cut into lumps of from five pounds to fifty pounds weight, is soaked for some days. When taken out, it is dusted over with dry bisulphite of soda, and is closely packed in air-tight boxes, in which it will keep sweet for years, and can be rendered fit for use at any time by soaking in a bath of cold water in which a small quantity of vinegar is mixed.

PRACTICAL METHOD OF DISGUISING THE TASTE OF BITTER SUBSTANCES. — M. Bouilhon suggests the chewing of a portion of liquorice root after taking sulphate of quinia, colocynth, aloes, quassia, and other bitters. The active principle of the liquorice, glycyrrhizine, seems to possess the property of nullifying and replacing tastes dissimilar to its own.

A LADY, who, though in the Autumn of life, had not lost all dreams of its Spring, said to Jerrold, "I cannot imagine what makes my hair turn gray. I sometimes fancy it must be the essence of rosemary with which my maid is in the habit of brushing it. What do you think?" "I should be afraid, madam," replied the distinguished dramatist, dryly, "that it is the essence of thyme."

A WRITER speaks of a hut so miserable that it didn't know which way to fall, and so kept standing. This is like a man that had such a complication of diseases that he didn't know which to die of, and so lived on.

THE WAY TO BE MISSED WHEN YOU DIE. — While you are living, be very kind, generous, and do as much good as you can to your relations and friends, but leave them nothing when you die, and you will be sure to be missed by them.

"I SAY, milkman, you give your cows too much salt!" "Why, how do you know how much salt I give them?" "I judge from the appearance of the milk you have brought us lately. Salt makes the cows dry, and then they drink too much water—that makes their milk thin, you know."

THE *Lancet* says: — "It is a curious fact that of the passengers in the train which met with a terrible accident lately, all, or very nearly all, who were asleep at the time escaped uninjured — nature's anæsthetic insuring them not only against fractures and contusions, but even against the bad effects of shaking and concussion."

MANY a man thinks that it's virtue that keeps him from turning a rascal, when it's only a full stomach. One should be careful, and not mistake bread for principles.

MEDICAL. — Annuitants are subject to a peculiar malady known as the long-liver complaint.

LAZINESS travels so slowly that poverty soon overtakes her.

VANITY never died yet of a surfeit.

LOVE.

AND yet earth brings its joy to loving hearts,
  And fairer than the fairest flowers
Are the new hopes that bloom along the way,
  As we walk 'mid the golden hours.

And is the love of hearts not beautiful?
  Yes, as the harmonies above
The voice of all creation, which proclaims
  In all its realms the power of love.

And is the love of hearts not sweet? Yes, sweet,
  Sweetest of all earth's store
Of joys, and all its tender sweetnesses
  Foretell the bliss for evermore.

And is the love of hearts not good? Yes, good,
  And blessed, for the smile of heaven
Falls on it, and all earth and life are spheres
  For noble thoughts and actions given.

And so earth brings its joy to loving hearts,
  And fairer than the fairest flowers
Are the new hopes that bloom along the way,
  As we walk 'mid the golden hours.

REV. CHARLES NAISMITH.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

EYESIGHT AND THE MICROSCOPE.

BY PROF. JOHN PHIN, NEW YORK.

AN article on this subject, from the pen of the well-known microscopist, Mr. Slack, appeared recently in the *Student*, and was copied into GOOD HEALTH. That article contains much valuable information, and many useful hints, but an experience of fifteen years would lead me to differ from Mr. Slack on one point, and to supplement his observations by a few of my own. The subject is an important one; and as the microscope has become a necessary part of the outfit of every student of natural history, it may be well for those who have had experience to give us the best information at their command, in regard to the precautions that should be observed in its use. I therefore make no apology for contributing my quota.

In using the microscope, I have found that the best system is that recommended by Dr. Carpenter, who has probably had as much experience in this matter as any person I know of. It is to alternate the use of the eyes, always keeping the unemployed eye open. But I feel confident that it is of no use to keep the unemployed eye open if it be made to stare at a dead-black surface. It is the exclusion of light from one eye, and the consequent unequal action of the visual organs, that is thus produced, that causes the mischief that we dread; and it matters not whether this unequal action be produced by covering the eye with the eyelid, or by excluding the light from it by other means, — the result is the same. In making observations with the microscope, all extraneous light should be excluded from the eyes. Hence the value of a properly-arranged shade. Such a shade, however, should consist of more than a mere flat sheet of pasteboard covered with velvet. It should have a perpendicular portion, rising up in front of the face, and cutting off all light except that which comes through the microscope. And now having provided a shield of this kind, which, by the way, is easily made of pasteboard blackened on the inside with dead-black varnish (made of alcohol, lamp-black, and a very little shellac), if we punch an inch hole at such a point that the unoccupied eye can see it in the same way that the other eye looks through the instrument, we will find that the fatigue experienced by that eye is vastly less than when it is exposed to the dead-black surface. A few trials will set at rest all question on this head, and the change from light to darkness is easily made by simply slipping a piece of blackened paper or card over the hole.

With few exceptions, we use altogether too much light with the microscope. Where a full flood of light is passed through a transparent object, the finer points are apt to be "drowned" out entirely; and it is only by modifying the amount of light by means of the diaphragm, that we are enabled to make out the more delicate details. Hence it will be found that the use of the bull's-eye condenser, for concentrating the light on the mirror, and consequently augmenting the *amount*

of light passing through the object, is, in general, totally unnecessary. This arrangement of the illuminating apparatus is totally different in its effects from that of the achromatic condenser, and cannot be substituted for it, as some persons seem to think.

No man can have worked long with the microscope without being led to a very careful consideration of the relative value of the various sources of illumination at his command. Much thought, and considerable experience, has led me to the following conclusions on this subject:

The first requisite in the light that we use is *whiteness*. Hence daylight, the light from a white cloud, the artificial white cloud illuminated by daylight, the light from the old-fashioned argand lamp burning sperm oil, the modern student lamp burning kerosene oil, and its various modifications, and the argand gas-burner are good,—their excellence being about in the order here laid down. Common gas-light, candles, and kerosene lamps, are inferior just about in the order we have named. White light is not nearly so fatiguing to the eyes as the reddish glare from a half-smothered combustion. Hence in all cases we must seek to have the most perfect combustion and highest possible temperature of flame in our sources of artificial light. It is true that this gives rise to great heat, but this difficulty is easily obviated by the use of a proper screen or shade, and none will be found better than the one previously described. Indeed, when working by artificial light, it will be found that the heat is one of the most efficient causes of injury to the eyes, and the screen that we have mentioned is, perhaps, quite as useful, from the fact that it cuts off heat, as from its excluding unnecessary light.

The second requisite is steadiness. Nothing is more trying to the eyes than a flickering light. The reason of this will be perfectly obvious on a very slight consideration of the subject. The eye has the power of adapting itself to the amount of light received by it; and whenever the amount of light varies, an attempt is made by the eye to adjust itself to the new conditions in which it is placed. Thus when we pass from a brilliantly-lighted room into the darkness of night, or from broad daylight into a dark cellar, we are at first entirely unable to distinguish objects. After a time the eye adjusts itself to the new conditions in which it is placed, and we are able to distinguish, with tolerable clearness, objects which at first were invisible. In some animals this process of adaptation seems to be voluntary, and to be effected with great rapidity. Such is the case with the cat. A good mouser will follow her prey from the brightest daylight into the darkest cellar, and keep it in view all the time. In man the process is effected slowly, and seems to be in a great measure involuntary. We go out on a bright winter's morning, when the ground is covered with snow, and we blink and wink for a long time, before we can adjust our eyes to the bright white light from which we cannot escape, since by looking up we get the sunlight from the heavens, and by looking down we get the same sunlight reflected from the earth. The same thing occurs on the white sands of the tropics; and as, in both cases, the amount of light thus forced upon the eye exceeds that which is within the range of adaptation of this organ, disease of the eyes is a very common result. But in the case of a flickering artificial light, the evil is produced by rapidly recurring demands for the exercise of this power, rather than for any excessive exertion of the faculty. But we all know that the effect in both cases would be the same. In the case of the microscope any variation in the strength of the light is magnified, and hence while a flickering light is injurious for ordinary reading, it is much more so when used for microscopic work. Of all sources of light, the naked gas-flame is the most unsteady; and yet we have seen young men working away with it for hours. The argand gas-lamp, with glass chimney, is much more steady, but it is not quite as white as a well-trimmed German student-lamp, burning good kerosene oil; and as this means of illumination is

the most accessible in this country, it is probably to be preferred above all others.

So much for the character of the light, and its adjustment. There are certain conditions of nearly equal importance that ought to be found in the microscope itself, and that are found in the instruments of the best foreign makers, as well as those of Tolles, Grunow, Zentmayer, McAllister, and others in this country. But I am sorry to say that in this country our habit of editorial puffery has brought into notice a class of microscopes that have been peculiarly destructive to the eyesight of the users. Prominent amongst these is a microscope, which has been lauded by most of our religious, literary, and agricultural papers, and which fails in the most essential particular, — means for accurate adjustment of focus. A few words will explain what we mean by this expression. If we attempt to examine any object by means of a very small lens, we will find that the lens must be held accurately at a certain distance from the object, or our view of it will be very indistinct. If we hold it very close to the object, or very far from it, we cannot see at all. When at the exact point for perfect vision, the lens is said to be properly *focussed*, and the term is also applied to microscopes of all kinds. This will be very elementary information to microscopists, but the purchasers of the microscopes now under discussion, are evidently not microscopists. Now the eye possesses within itself the power of adjusting its focus without changing its absolute distance from the object. Thus if we look at two objects lying in a direct line from us, one being ten yards off, and the other a hundred, we cannot see both objects distinctly at once. If we adjust our eye to the near one, the other will appear indistinct, and *vice versa.* The eye exerts the same power when using the microscope, and attempts to adjust itself for distinct vision if the instrument fails to do it for it. But the range of the eye in this direction is comparatively limited, and a very trifling want of correct adjustment on the part of the microscope produces a very injurious strain. Hence the necessity for a ready means of producing a delicate and accurate adjustment of the focus of the microscope. This is totally wanting in the Craig, and other instruments of the same class; and within a few days we saw, in an English scientific periodical, an advertisement of a microscope which claims superiority on the ground that it does not require focussing. Such a microscope must be essentially bad, except for a very limited class of objects. All good microscopes are furnished with arrangements for focussing. A second requisite is that the instrument should be so steady that the object shall be retained in view and in focus without change. Any tremor is injurious to the eyes, and especially is this the case when that tremor produces a continual change in the relation of the object to the focus. This difficulty is met chiefly in the use of small, single lenses, that are held in the hand, and it may be safely said that a single hour's work with a lens of this description, held in the hand or mounted on an unsteady stand, will cause more injury to the eyes than weeks of work where a first-class instrument of far higher power is used. It has always seemed to us that watch-makers, engravers, and those who use lenses, do not sufficiently appreciate this fact. They in general mount their lenses on wire stands, which tremblingly respond to every footstep that falls upon the floor, and thus cause continual demands upon the eye for readjustment of focus. So, too, we have seen students of botany poring over plants by the hour, and using a small hand-lens, which must have been utterly destructive to the eyes. Wherever a microscope — single or compound — is used for more than a few seconds, it ought to be mounted upon a stand so firm that all vibration, and especially all disturbance of the focussing, will be avoided.

In conclusion, I may add that the conditions here required may be found in apparatus of the cheapest kind. And although, until within a few years,

some makers adhered to the old, shaky form of microscope, used by Adams nearly a century ago, yet to-day, steady and easily-adjusted microscopes can be had for prices as low as five dollars, as witness the household microscope of McAllister. I may also add that the habit of *observing* with only one eye, while *looking* with both, is easily acquired; but lest the attention should be disturbed by the unoccupied eye looking *through* the hole which I have advised to be punched in the shade, it may be well to cover this hole with writing-paper whose transparency has been increased by oil or gum.

MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Fifth Paper.

Intestinal Canal.

AFTER the food has been properly digested in the stomach, and reduced to a pasty mass called "chyme," it passes through the pyloric orifice into the duodenum, the upper part of the intestinal canal, where, by the action of the biliary, pancreatic, and intestinal secretions, it is converted into a clearer fluid, called the "chyle," and is in a fit condition to be absorbed by the lacteals, and conveyed as a rudimentary or crude blood into the venous circulation near the heart.

The alimentary or intestinal canal is obviously divided into two sections, a narrower and longer portion, disposed in numerous coils or convolutions, the *small* intestine; and a much wider and shorter portion, the *large* intestine. The whole extent in the adult man is about thirty feet, or six times that of the body, the small intestine forming about five-sixths of the whole length. The division between these is very distinct, the large intestine commencing by a dilated portion lodged in the concavity of the right hip-bone, and called the cæcum. Commencing at the stomach, we find, from above downward, the *duodenum*, twelve finger's breadth long, and for the most part attached to the spine; of the remaining portion of the small intestine about two-fifths is called *jejunum*, from its being generally found empty; the lower three-fifths is called *ileum*, from its many convolutions, and terminates in the cæcum above alluded to; there is no mark by which to distinguish the end of the jejunum from the beginning of the ileum. The large intestine is about five feet long, the ileum opening into it in a valvular manner; attached to the cæcum is a worm-shaped appendage, two or three inches long, the rudiment of the long cæcum found in the lower mammals; into this tube, of the size of a goose-quill, particles of undigested food, as half-cooked beans, or seeds, stones of cherries, shot, and various foreign substances of this size, sometimes enter, causing inflammation, and not unfrequently death. From the cæcum the large intestine ascends on the right side as high as the liver, crosses the abdominal cavity, and turns downward on the left side, becoming curved like the letter S in the concavity of the left hip bone, constituting respectively the ascending, transverse, descending, and sigmoid flexure of the *colon*; it then descends in a straight line, along the middle of the sacrum, to the outlet of the body, in this part of its course receiving the name of *rectum*. The intestines are bound down to the spine by a fold of peritoneum, called the *mesentery*, attached to the concavity of their convolutions; this allows great freedom of motion without danger of displacement. In treating of foods it will be seen that a short and simple intestinal canal and simple stomach are generally coexistent with an animal diet, and that a vegetable diet requires greater length and complexity — that man occupies in this respect a position, already indicated by his teeth, inter-

mediate between carnivorous and herbivorous animals.

The muscular fibres of the intestines are both longitudinal and circular, enabling them to compress and propel their contents in an undulating manner. The lining mucous membrane is studded by a multitude of involuted tubes or follicles, opening on the inner surface, which secrete a fluid important in digestion. In the small intestines, the mucous membrane presents numerous folds, arranged transversely around three-fourths or five-sixths of the canal, from one-eighth to one-quarter of an inch deep; they are peculiar to the highest animals, and are, doubtless, intended to delay the food in its passage, in order that its nutritious portions may be fully taken into the lacteals. In the small intestine this membrane is covered with minute processes or "villi," projecting from its surface into whatever fluid the canal may contain; they are conical in shape, and about one-fiftieth of an inch in length, and are especially concerned in the absorption of chyle into the lacteals, which commence in them. There are also glands, solitary and in patches, secreting important digestive fluids. The lower part of the small intestine contains "Peyer's glands," interesting as being the seat of ulceration in typhoid fever, consumption, and cholera; in the first and last they are probably the channels by which the system seeks to expel the poison. The large intestine has no villi, but has many large glands and internal folds. After the lacteals have performed their function, there remains in the canal a reddish brown excrementitious product, gradually becoming solid in its progress toward the rectum.

Demand for Food.

The constant waste and decay of the tissues is the chief source of the demand for food; as this demand is in proportion to the functional activity of the muscular and nervous systems, we see the propriety of adapting the food to the habits of life; what would be necessary for the hard-working laborer in the open air, would be very injurious to the sedentary person. This is well seen in the animal world; the cold-blooded and sluggish reptile can go without food for months with impunity, while a warm-blooded and active bird or mammal is soon starved. Animal heat is maintained by the union of carbon from the food and waste of tissues with the oxygen supplied from the blood purified in the lungs, by as true a combustion, and with the evolution of the same amount of heat, as if the fuel were burned in a furnace; hence the demand for food will be regulated by the external temperature, and a diet which is sufficient in a warm climate, or in summer, will not enable the body to resist the rigor of the arctic regions or the cold of mid-winter. Carbon and hydrogen are the great heat-sustaining elements of our food. Many natural and diseased conditions, accompanied by increased secretion or exhausting discharges, require a large amount of nutritious food.

Hunger and Thirst.

The want of solid food is indicated by the sensation of hunger, and that of liquids by thirst; hunger is referred to the stomach, thirst to the upper part of the throat; but the conditions of these parts depend on the wants of the system. The sensation of hunger is probably dependent on the turgid condition of the capillary vessels of the stomach, preparatory to the secretion of the gastric juice, excited by the sympathetic nerves, and communicated to the nervous centres; when food is introduced, the fluid is secreted, the capillaries are relieved of their blood, and the immediate cause of the nervous impression is removed. It is well-known that hunger is temporarily relieved by the introduction into the stomach of indigestible substances; earth, clay, and other articles are swallowed by savages and travellers when hungry, with the effect of removing, for a time, the sensation of hunger; but, as the wants of the system are not thus satisfied, this local relief soon passes away, and food is demanded more imperatively than at first. The sensation of hunger may

not be noticed, if the mind or body be actively engaged; the student who takes a light supper, may labor a great part of the night without feeling hungry; but when he lays his aching head upon his pillow, to rest, his empty stomach warns him of the necessity of food, and refreshing sleep is out of the question till this be taken. Thirst, more than hunger, is connected with the state of the general system; for it is immediately relieved by the introduction of fluid into the stomach, from which it is very quickly absorbed by the veins; in cholera, where the fluid excretions are unnaturally increased, the demand for liquids is extreme, and may be satisfied by injection into the veins instead of introduction into the stomach. Salted and spiced food, ardent spirits, and tobacco, cause thirst; the former leading us to drink that the food may be more easily digested, and the latter that the dilution of the poison may excite less irritation in the mucous membrane. Whatever excites great thirst, we may be sure is not good for us; in the thirst of a fever, the blood is affected, causing an unnatural state of the secretions, and a consequent demand for diluting fluids. If food be not supplied, the body feeds on itself, and the blood derives its materials of supply from an increased waste of the tissues; the tissue most destroyed is the fat, the loss of which is accompanied by a fall in the animal temperature. In man, total privation is not borne above a week; but, by the aid of water, life may be prolonged considerably beyond this.

Gastric Juice.

The gastric juice, the digestive fluid secreted in the stomach, contains about fifteen parts in one thousand of albuminous matter, and about one-third this amount of lactic acid. The albuminous matter is pepsine, its most important ingredient; it is a ferment, and changes coagulable albumen into uncoagulable albuminose, the form in which absorption takes place; for instance, milk is at once coagulated by the acid of the stomach, then pepsine acts upon it and liquifies it again. Lactic acid is necessary for the action of pepsine; hence both these substances are given in various forms of dyspepsia. The gastric juice acts upon the food from without inward, more speedily if shaken, and most favorably at the temperature of one hundred degrees Fahr., the heat of the interior of the body—hence icy cold and very hot drinks interfere with the process of digestion. It acts, however, only on the albuminous elements of food, leaving the starchy and oily food untouched, on the gluten of bread, but not on the starch; so the casein of cheese is dissolved, but the oil globules not; hence the liability of rich cheese to disturb a delicate stomach. This organ requires rest, as it cannot secrete the gastric juice all the time, nor at improper times; it should not be required to work at night, the period for the repose of all the organs.

The innumerable minute, soft, and velvety villi, arranged along the plaited ruffle-like folds of the small intestines, and projecting like the roots of plants into the fluids of the earth, have no open mouths to receive the nutritive elements prepared for them; the absorption is effected through their very thin membrane by the process of endosmosis. Every animal membrane has an affinity for the transmission through its substance of certain fluids,—some one, some another; this process may be seen at any time by the immersion of a dried bladder in warm water. It is most active in the living membrane, on account of the circulation of the blood in it, which absorbs and carries off the new materials as fast as they are taken up; as in a reservoir, the fluids are constantly entering and leaving, but never run over.

The Liver.

The albuminous and sugary portions of the food are taken up by the blood-vessels of the villi, and pass into the blood, but not directly to the heart. Their innumerable little vessels unite like so many paths in a highway, and finally form the portal vein, which collects and conducts all the blood from the digestive organs to the liver. This

will explain why the liver is so frequently diseased, as it is charged with whatever is hurtful, as well as nutritious, that we have supplied to our stomachs. This blood enters the substance of the liver, and is distributed to the minute subdivisions in the lobules of this gland. Here are secreted the sugar and the bile for use in the system, the former for nutrition, and the latter poured into the intestine. The small branches then unite to form the hepatic vein, which opens into the vena cava, and thus the nutritive materials from this source reach the heart. It is fortunate for humanity, as man, of all animals, habitually commits errors in eating and drinking, that the blood which has absorbed the digested materials of the food does not go directly to the heart, and that this great purifier, the liver, is always ready to do what it can to relieve us of the penalties incurred by ignorance or wilfulness in the matter of eating; knowing this, we should be careful not to impose too heavy a task upon the faithful liver, as when this, our best friend, fails us, we are truly to be pitied.

The digestive fluids, the saliva, and gastric and intestinal juices, derived from the blood, are taken back into it with the food; otherwise the twenty pounds secreted daily, if lost, would be more than the food would supply.

There are, therefore, two ways in which the chyle gets into the blood; the first by the blood-vessels, through the liver, to the vena cava; the second by the lacteals and thoracic duct, to the subclavian vein; but both open into the impure blood near the heart.

The albumen, sugar, and oily matters are further acted on in the blood itself; the first remaining as such, the other two disappearing, we know not how, but serving for nutrition. For these acts a great amount of blood is requisite; hence the impropriety of causing these necessary congestions at unusual times, and at night; mental depression and vivid emotions interfere with digestion; good news, as well as bad, may take away the appetite.

The singular transformations occurring in the bile are worth a moment's notice. Its chief ingredients, though formed from the blood, are not found in it; for its great and mysterious manufactory we supply the daily materials, good or bad. The bile is more abundant in vegetable than in flesh-eaters; there are more bilious diseases in the tropics than in temperate zones, and in summer than in winter; we eat instinctively less animal food when the temperature about us is high. It is always forming, and pouring into the intestine, and to the amount of two and a half pounds daily; during digestion the gall-bladder, a reservoir made from the distension of one of the ducts, empties its contents into the intestine. If not secreted, and poured into the canal, we get sick, and the coloring matter shows itself in the disease called jaundice; gall stones, inspissated bile chiefly, sometimes obstruct the ducts, causing excruciating pain, sometimes called bilious colic. The bile and the sugar in the liver of animals give the mixed bitter and sweet taste when this organ is cooked.

Classes of Foods.

All animals require both organic and inorganic substances for their development; the former only have been regarded as food, though in most of them inorganic matter exists in considerable quantity. The organic substances used as food, may be divided into three groups, as proposed by Dr. Prout. 1. The *saccharine* group; including those substances from the vegetable kingdom, analogous in their composition to sugar, consisting of carbon united to oxygen and hydrogen in the proportions in which the latter form water; to this group belong starch, sugar, gum, woody fibre, and various tissues of plants convertible into sugar by simple chemical processes. 2. The *oleaginous* group; including the fats and oils, animal and vegetable, and alcohol; this differs from the first group in the predominance of carbon (from sixty to eighty per cent.) and hydrogen, the small proportion of oxygen, and the entire absence of nitrogen. 3. The *albuminous* group: substances rich in nitrogen, united with the other three ele-

ments of the preceeding groups — including those vegetable or animal, closely allied to albumen, and therefore the greater part of the animal tissues, such as fibrin, albumen, gelatine, caseine, and vegetable gluten; those containing gelatine have been made into a distinct group by some. A fourth group, the *inorganic*, contains water, either alone, or holding in solution or suspension important elements of nutrition, and various earthy salts and chemical compounds necessary for the growth of the tissues and the maintenance of health.

These different classes of food will be treated at length in the next paper of this series.

The Rationale of Toys.—Our pity has been often excited for poor children who have no toys; might it not be also sometimes reasonably called forth for those children whose toys are too many and too good? The poor children suffer because they have no material whereon to exercise their imaginations; the poor little creatures, even at that early stage of their existence, enter upon the stagnation which settles like a stultifying load on so many, in whose monotonous life no light from the region of the imagination breaks on the daily routine of toil.

The other children suffer because they have too many things to distract them, so that their imaginations find no ground to rest and build upon. In their cradles they have a foretaste of the distracting whirl and hurry of the busy world of which they are probably destined to know so much.

What a happy thing for some nurseries were a kind of fairy to come and sweep off half the contents of the toy drawers, and at the same time bar all possibility of replenishing them. Imagine the result of such a fairy visit to some of those elaborate doll's houses, which presented to the little ones replete with everything imaginable, is admired, rejoiced over, arranged, and rearranged, for a week — then forgotten, left in dust and disorder. Once cleared irretrievably, of all but a few necessaries of doll-life, we should soon see most fertile resources of the imagination, the most unlikely things metamorphosed by the young into suitable doll-property, and the real pleasure of the toy for the first time realized. How should a child derive the same amount of happiness from a handsome whip ornamented and carved already, as he would from a whip whose handle he had himself sought in the hedges, and then cut, notched, scraped, or otherwise adorned in imitation of the silver-mounted or ivory-carved whips of his elders. That the stout stick, representative of his father's horse, on which he rides, bears but distant resemblance to that animal, matters not — it has far more than the toy-shop horse, which is of the wrong color; his horse is of any color he wills, and he can canter him over every prairie and desert of earth or fairyland.

The toy-shops, with their ingenious devices for quenching the sparks of imagination in our children, bring me back with a sense of refreshment to a nursery I once heard of, where the one great plaything was sand, which the wise mother had let her children bring by bagsfull from the sea to the town nursery. I have always wished I could have known that nursery. Who could doubt that it was a happy one? Whoever does must have had all knowledge of play entirely spoiled by those elaborate productions, most truly described as "not playthings — unless the children can break them up, and make real toys of the bits;" toys, that is, which set no bounds to the imagination, by any too definitely marked assertion of what they are meant to be. It is thus that toys seemingly most inadequate will so adequately satisfy a child's mind.

Is not the test of the value of a child's toy the amount of constructive or imaginative exercise which it calls forth? a test which may possibly apply also to the toys of their elders.

Ozone from Plants. — They are in reality great store-houses of health, since they evolve quantities of ozone, which is developed by the direct action of the sun's rays, and, in some cases, continues to be evolved during the dark.

ARTIFICIAL EYES — How and why they are worn.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

THE wearing of some artificial device to conceal the loss of the visual organ, seems to date back at least to the time Egypt was a flourishing country, centuries before the Christian era. The manufacture of artificial eyes has always been a trade by itself. The various precious metals were used in their construction, such as gold and silver, and afterwards copper and ivory. Patriotic citizens have carried them to the public treasury as an offering in time of war or general distress. In Europe they were naturally somewhat of a rarity, till the invention of porcelain eyes in the sixteenth century. We quote the following from Ambrose Parey, in the translator's quaint old English of 1665. He says: "Therefore if that through any mischance, as by any inflammation, any man's eie happen to be broken or put out, and the humors spilt or wasted; or if it be strucken out of his place or cavity wherein it was naturally placed, by any violent stroke; or if it waste or consume by reason of a consumption of the proper substance, then there is no hope to restore the sight or function of the eie, yet you may cover the deformity of the eie so lost (which is all you can do in such a case) by this means: If that when you have perfectly cured and healed the ulcer, you may put another eie artificially made of gold or silver, counterfieted and enamelled, so that it may seem to have the brightness or gemmy decency of the natural eie, into the place of the eie that is so lost."

Here follows a rough wood-cut of such enamelled eyes, in shape not unlike those now worn. The great surgeon of his day then goes on to say:

"But if the patient be unwilling, or by reason of some other means, cannot wear this eie so prepared, in his head; you may make another in this wise. You must first have a string or wier of iron, bowed or crooked, like unto womens' ear-wiers, made to bind the head harder or looser, as it pleaseth the patient, from the lower part of the head behind, above the ear, unto the greater corner of the eie; this rod or wier must be covered in the silk; and it also must be somewhat broad at both ends, lest that the sharpness thereof should pierce or prick any part that it cometh unto. But that end wherewith the empty hollowness must be covered, ought to be broader than the other, and covered with a thin piece of leather, that thereon the colors of the eie that is lost, may be shadowed or conterfieted. Here followeth the figure or portraiture of such a string or wire."

Nowadays an artificial eye is made of glass or enamel, and is a little thin light shell formed to represent the front of the eyeball. Their manufacture, although a separate trade, is quite simple. The part imitating the sclerotic, or white of the eye, is made of white enamel, with a tinge of yellow. The posterior lamina of the central piece is colored and streaked, to look like the iris, or colored part of the eye. On the middle of this lamina a circular patch of black enamel is laid, to imitate the pupil, and the superficial lamina is transparent glass. Threads of red enamel are spread over the surface in imitation of blood-vessels, and are melted in before the blow-pipe. A great variety of colors and shades are made, and considerable difference in the shape and size, so that from a large collection almost any eye can be imitated, though of course it is much better to have the eye made to exactly match the other sound eye, and this is the method most frequently followed.

The instructions given to persons wearing an artificial eye, are:

It should be taken out every night, wiped and washed, and replaced in the morning.

To put the eye in. Place the left hand flat upon the forehead, with the fingers downwards, and with the two middle fingers raise the upper eyelid towards the eyebrow; then, with the right hand, push the upper edge of the artificial eye beneath the upper eyelid, which may be allowed to drop upon the eye. The eye must now be supported with the middle fingers of the left hand, whilst the lower eyelid is raised over its lower edge with the right hand.

To take the eye out. The lower eyelid must be drawn downwards with the middle finger of the left hand, and then with the right hand the end of a small bodkin must be put beneath the lower edge of the artificial eye, which must be raised gently forward over the lower eyelid, when it will readily drop out; at this time care must be taken that the eye does not fall on the ground, or other hard place, as it is very brittle, and might easily be broken by a fall. In order to avoid this accident, the patient should stoop over a cushion or handkerchief placed on a table, or over a bed.

The best made artificial eyes will not wear longer than a year, as the enamel becomes rough, and a source of irritation to the lids and socket. A spare one should be kept on hand in case the one being worn is broken, or cracks, as it may do from sudden variation of temperature. There is, or should be, no pain from the insertion, removal, or wearing an artificial eye. It is amusing to see the charlatans taking advantage of popular ignorance, by advertising to *insert artificial eyes without pain.* The dentists might as well ad-

vertise to insert false teeth without pain. With what degree of comfort an artificial eye may be worn, depends entirely on the individual case. When the eyeball has been properly removed for any cause, then a glass eye can be best worn. It is curious to read the advertisements of the manufacturers of artificial eyes. One would almost believe it was, on the whole, better to wear glass eyes than have natural ones. It is a misfortune to be obliged to wear a false eye, for it is a source of constant expense, and of frequent mortification and anoyance. Fortunately modern science has, by modifying the necessary operation, and by the perfection of the imitation itself, done much towards mitigating this so frequent deformity. When the eyeball from injury or disease has shrunk to a small size, the eyelids lose their support and elasticity, and soon become motionless, and sink into the orbit; consequently the edges of the lids, with the lashes, turn inwards towards the remains of the globe, and irritate it. The space between the lids and the globe also becomes contracted, and the tears and mucus gather behind the lids, because the eyeball no longer pushes them forward and out, or towards the nose, to pass down the tear-passages into the nasal cavity. In these cases an artificial eye, when worn, will take the place of the diminished eyeball and restore the proper functions, so that the patient will be much more comfortable. Whether an artificial eye can be worn must be decided by the case itself; that is, it is dependent on the state of the globe and lids, for injury and disease leave these in very different conditions. The more shrunken and smaller the globe, the better chance for a false eye. If there are fleshy attachments betwen the lids and eyeball, they will probably have to be removed or overcome; but this is one of the most difficult things the ophthalmic surgeon has to do, for no matter how thoroughly these bridles are separated, they grow again, and are very troublesome, frequently absolutely preventing an eye being worn. If the eyeball is larger than natural, or has any protuberances or projections on it, an artificial eye cannot be worn. In general terms, if any part of the front half of the original eyeball remains, it will interfere with, or prevent an eye being worn. The slightest pain on pressure over the remains of an eyeball is a positive contra-indication to wearing a false eye. Such an irritable stump should be removed, and then the patient can wear a glass eye with ease.

Whenever an eye has been lost by injury or disease, any portion of the eyeball remaining may, perhaps twenty years afterwards, produce pain and trouble in the remaining sound eye. This is now an established fact. A patient with an injured or inflamed eye will

have, in the other sound one, intolerance of light, sensation of fulness, even perhaps perceptible to the touch, inability to use the eyes, and fatigue, long before he may apply to the ophthalmic surgeon, who at once recognizes this insidious sympathetic irritation from the other eye, as we call it. Now the best and only means of allaying this sympathetic inflammation, is to at once remove the remains of the injured eyeball. But we frequently have to remove an eye even while there is sight in it, to prevent its affecting the other; for instance, when a foreign substance, like a piece of iron, has gone into the eyeball. The removal of the eyeball is called *enucleation;* and that the community may better understand the necessity, simplicity and effectiveness of this so valuable operation, is one of the purposes of this article. Also that they may be taught to no longer dread it as something terrible, to be avoided to the last. Enucleation may be needed simply to get rid of an enlarged eyeball, which the lids will not cover; it having become a deformity, which we remove to give place to a false eye. A high authority says very clearly and distinctly, the facility with which enucleation is performed, its great freedom from risk, and the adaptability of an artificial eye, ought to make us consider a disorganized eye, which is the seat of pain or annoyance, as a foreign body, whose removal the sooner it is accomplished the better. If not painful at the time, it is a deformity, and is liable at any time of ill-health to become the seat of inflammation, and affect sympathetically the opposite organ. It is not only unwise, but incorrect, to bring before the patient's imagination the idea of "taking the eye out," and omitting the scientific advantage of enucleation. Still another high authority says in these words: "Whenever I am satisfied that an injured globe is utterly lost, I always advise its removal without loss of time. By adopting this course, the patient's suffering, often extreme, is at once put an end to, and I think, also, the risk of sympathetic inflammation of the other eye is avoided."

In truth, the more this operation has been used by surgeons at the great centres of ophthalmic practice and clinical study and teaching, the more strongly do they speak of its value, simplicity, and necessity. Now, I constantly find among the community a perhaps natural horror in reference to removal of the eyeball, no matter how useless this organ may have become as respects sight, and when it has been the seat of severe or lasting pain; and I have even found medical gentlemen, when bringing their patients to the specialist, shrinking from advising them to submit to the removal of a sightless globe. There seems to be a sort of vague sensation

among the community, and perhaps even among physicians, that enucleation of the eyeball is a formidable and dangerous operation, only to be resorted to in malignant disease, or as a last resort. People in general do not distinguish between the comparatively trifling operation of enucleation of the globe, and the, at present, rarely necessary and more formidable one of evacuation of the contents of the orbit. I will, therefore, as simply and in as untechnical language as possible, explain the anatomy of the operation, as I have shown its necessity and application.

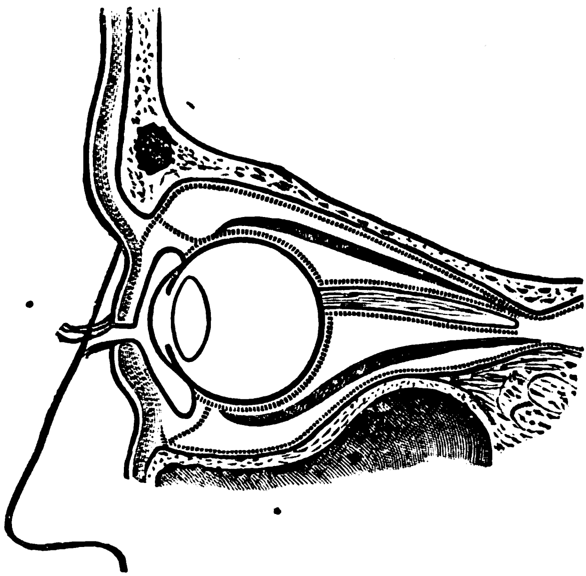


Fig. 1.

Fig. 1 is a diagram of a vertical section through the orbit and eyeball. The thick dotted line represents a sort of strong fibrous capsule which, as is seen, lines the orbit and passes around the eyeball itself. The tendons of the muscles which move the eyeball pass through this cup-like membrane, as is seen above and below in the diagram. For the surgical purposes of this operation of enucleation, as it is called, it may be regarded as a membranous sac in which the globe rolls, and which is pierced by the tendons of the six muscles moving the eyeball. Now, then, if we simply cut these tendons in front of the capsule at their insertion into the globe, and the optic nerve behind, which goes from the eyeball to the brain, then the useless or painful globe can be removed, and we leave this membranous sac as a basis or support for an artificial eye, and the muscles being still attached to this capsule will therefore move it, and the glass eye lying on it, in nearly as great a degree as the muscles

will move the natural eyeball. I will here at once answer the question which may arise, by saying the false eye will move nearly, if not quite as well, and sometimes even better, bedded on this membranous capsule, than if resting on a stump of a lost eye. I may say, I have seen the muscles move the glass eye sufficiently to deceive, at first glance, even an ophthalmic surgeon, as to whether the eye was false or not. But the point is just here, and it must be kept steadily in mind: The artificial eye will move well enough on the capsule, except in rare cases, therefore the remains of an injured eye had better always be removed before a false eye is worn, because it may be irritated by it, and give rise to this dangerous sympathetic irritation I have described above.

It is only within the last twenty years that this operation of enucleation, now found so frequently necessary, has been generally practised. In former times, the necessity for the removal of an injured eye to avoid its affecting its fellow, was felt, but the operation for such removal included the evacuation of the contents of the orbit, muscles, membranes, and all. Moreover, the removal of a portion of the offending globe, still occasionally practised, was not found to be equally beneficial, whilst the patient was frequently, if not always, a long time in recovering; on the other hand, after simple enucleation the entire offending organ is disposed of, and the patient has no further trouble than the operation, being able very shortly, within a fortnight, to wear an artificial eye. I do not in any way pretend that the necessity of carrying a false eye in the socket is a trifling circumstance. It is an expense, and a constant source of annoyance and chagrin; but on the other side is the certainty of losing the other sound eye by that insidious sympathetic inflammation so dreaded by the ophthalmic surgeon for his patient. The expense and annoyance, also, of a false eye, is not to be compared with the deformity of an enlarged and discolored eyeball, which, when removed to give place to an artificial eye, renders the bearer able to obtain and pursue employments from which they are otherwise quite cut off. When an artificial eye can be worn, it is generally better than the wearing a patch, or dark spectacles with side-pieces. Where original injury, or the old operations, have not interfered with the eyeball and its surroundings too much, an enucleation, when practised, gives more and better room for a glass eye, and, as I repeat, less danger to the other eye.

Persons who have lost an eye, even if they wear an artificial one, frequently have a peculiar look on that side of the face, which has a different outline and feature compared with the other. They

appear thinner, or not in good health, to which the bright cheeks and lips give the denial. This is due to the fat, which is in the orbit, and on which the eyeball rests, becoming absorbed, and allowing the membranous cup and false eye with it to sink deeper. This, of course, is quite unavoidable.

I have thus shown how frequently, and why, ophthalmic surgeons are forced to remove the eyeball, and hence how often we may meet with those obliged to wear false eyes to conceal the deformity. But I trust I have also shown my readers the simplicity of the present operation of enucleation, and in part, at least, removed their natural horror of losing even a blind and offending organ, perhaps frequently painful, and always a constant source of danger to the other sound eye.

THE FALL OF THE LEAF.—There is great truth in the observation of many invalids who pull through the summer, dying, unless great precaution be adopted during the sober, ashen, gray weather of autumn. These withering months are peculiarly trying to phthisical patients scattered throughout the country. All who can afford it, of course, will prepare for wintering in some salubrious climate, either in the South or abroad. Each place has its advocate, and peculiar advantages. To the great majority whose circumstances and position in life will not permit of change, it is that we specially address ourselves. We most strongly urge upon all suffering from chest affections, or who are prone to returns of thoracic complications at this season, to prepare either to resist or subdue the attacks. Chest preservers, lined with chamois, will be found efficacious, and a simply-made cotton-wool respirator equally beneficial to be worn, particularly by those whose duties force them out in the early morning or late evening air. Professor Tyndall tells us that in using the cotton-wool respirator, the atmosphere of the highest mountain may be breathed in the sick-room of the invalid, so far as purity goes. The great object is having the air coming through the cotton-wool for breathing purposes. And as prevention is better than cure, we particularly recommend, during the present and approaching season, not only the wearing of respirators, but of chest preservers also.

HICCUP.—A most distressing and obstinate complaint to those in whom it occurs. We do not refer, of course, to the hiccup attendant upon great prostration of the system, and met in connection with *delirium*, or convulsions, or to hiccup the effect of debauchery, but to those instances, very frequent indeed, of a simple spasmodic condition of stomach and œsophagus, which assails the individual without any other symptom of disease, and in the treatment of which antispasmodics prove inert. Relief can be obtained by directing the patient to hold the arms straight above the head, and to keep inspiring as long as is feasible, so as to retain the air in the lungs for as long a period as possible. The oxygen of the air acts as a stimulus in provoking the paroxysms, and the carbonic acid in the unexpired air acts as a sedative in warding off the hiccup.

WATER-TANKS AND CISTERNS, after a summer drought, should be examined, and if need be repaired; but in every instance well and carefully cleansed before being allowed to fill up again with water. Mischief is done, and disease induced and propagated by the use of bad water, because the sediment, if not washed out, becomes mingled with every fresh influx of water. A very general and most virulent and fatal epidemic of diphtheria, and severe attacks of typhoid fever, have been known to be produced by the neglect of this essential duty.

PURE WATER.

IT is certainly remarkable that, in our advanced condition of civilization, notwithstanding the scientific progress we have made, such a question as — whether is pure or impure water best for us? — should arise. It is not, by any means, an axiom that Nature dictates what is best and most wholesome for us. As a rule, we relish and enjoy most those things which are unwholesome, and that which applies to our food is equally true in respect to our drink. For drinking purposes we like water to be cool, bright and sparkling. Popularly it is admitted *a priori*, (from the cause to the effect,) that the purer water is the better; but it is reasoned *a posteriori*, (from the effect to the cause,) that sparkling, bright, and cold water is necessarily pure. It happens, however, that the exquisite coolness of some waters is due to the salts contained in solution from which also the beautiful crystal-like brightness is derived, while the sparkling effervescence results from the liberation of gases held in solution. Such water delights the eye and pleases the palate, especially on a hot summer's day: it is *par excellence* "hard," and if the truth be told, is often nothing else than filtered sewage, in which the qualities so highly appreciated are imparted by nitrate of ammonia and other salts, washed out of decomposing organic materials.

Again, carboniferous waters are highly prized as palatable, cool, and sparkling, and although a little carbonate of lime probably may not do much harm to most people, yet excess of calcic salts might be disagreeable to some patients. All mineral waters occasionally set up febrile disturbance in subjects of the gouty diathesis. So much for prejudice, which is, as the child's prejudice in favor of jam, a relative question of nasty and nice. If we consider what constitutes hardness, we see that pure water must of necessity be soft, for the harder the water the greater is the amount of saline material contained in it. Pure water is a very rare thing; the nearest approach to it is rain-water, collected in perfectly clean vessels in the open country after continued rains have cleansed the atmosphere. The purest water derivable from any natural reservoir is that of Loch Katrine, in Scotland, the solid matter contained in a gallon of which is only one grain. Many waters in common use, however, contain considerable quantities of solid matter. In considering the purity of water as affecting the death-rate, we must not omit to mention organic impurities, which, though often inappreciable as regards the condition of hardness, have but too frequently carried death into the cup, and that, too, through germs which have baffled detection. The contamination of a water supply is usually the result of carelessness, and in most instances the removal of pollution is within our own power. Excremental poisoning is a subject of immense importance to a Town or City Council, and measures to guard against it are far more worthy their consideration than the number of grains of carbon and sulphur salts their supply contains.

The ordinary method by which the hardness of water is tested is based upon the fact that soap readily decomposes the salts of the alkaline earths which form insoluble compounds with the fatty acids, and the common experiment is performed with a standard alcoholic solution of soap, a measured quantity of which is mixed with a standard measure of the water; if no curdling takes place on shaking the mixture, but a froth instantly obtained, the water is soft; if, on the other hand, the soap solution is curdled or broken, the water is said to be hard, and a second quantity of the standard solution is added, or a third, or more, until a froth can be obtained on shaking the mixture, and according to the number of measures of standard solution used, so is the calculation of the degree of hardness of the water made.

In ordinary washing, if we use water of four degrees of hardness, the soap will lather at once; but should our water be of five or more degrees of hardness, the soap will curdle until we have wasted sufficient to combine with the salts of the alkaline earths in solution in the water, after which it will dissolve and lather.

The hardness or softness of the water has little or nothing to do with the death-rate; and it is a common fact, that in some districts of Scotland, where the carboniferous water is blamed by the peasantry as the cause of the urinary diseases from which they suffer, it has been noticed that those affections are mostly confined to the male portion of the community, who rarely partake of the water without a substantial qualification of whiskey in it.

Regarding the question at its worst, water consumed in drinking, whether hard or soft, has perhaps no influence at all, or at all events very little, upon the health generally, and that little is in favor of soft; while, from the hygienic and economic point of view, soft water is infinitely superior to hard.

BREAD MADE FROM WHOLE WHEAT.

When told that it is quite unnecessary to convert wheat into flour before making bread, one is inclined to express some astonishment; but seeing certain colors are now mixed, and that on a large scale, without any previous grinding, and without any rubbing at all, thus sweeping away with the greatest expenses that attended the trade, we may not refuse to listen to a plan for doing away with the use of millstones, bolting cloths, and all the paraphernalia of the flour manufacturer.

The new system of bread making is the invention, as we believe, of a Frenchman named Sezille. Let us state, by way of preface, that according to some scientific men the total amount of indigestible matter, or bran, in wheat, is not more than from four to five per cent. of the whole; by the present method of flour grinding and bread making, scarcely eighty per cent. of the alimentary part of the wheat is made available. The average quantity of what is called in France, *pain bis-blanc*, whitey brown, or good household bread, is said to be 112 kilos. from 100 kilos. of wheat; M. Sezille says he can obtain from 145 to 150 kilos. from 100 kilos. of wheat. This is an economy of one-third, or nearly so, and would, according to the inventor's account, save in France alone, twenty-five millions of hectolitres of wheat per annum. A hectolitre is equal to twenty-two gallons. We leave our readers to calculate what the world would save, should M. Sezille's plan turn out as admirable as it looks at first sight, and be universally adopted.

Now, for the method itself, which is divided into three successive operations: —

Firstly. The wheat is placed in a mash-tub, or other vessel, with more than sufficient water to cover it, and well stirred with a peel for some minutes; by this operation all the over light or damaged grains, as well as dust and other impurities, will rise to the surface, be dissolved, or held in suspension; at the end of half an hour the water is drawn off, and the wheat, having been allowed to drain, is afterwards placed in a cylinder of plate-iron, pierced or worked, so as to have the effect of a rasp, when made to revolve. With the aid of this cylinder, from two to three per cent. of the outer pellicle, which is the coarser, is easily removed; as to the second skin, and that in the crease of the grain, it only amounts to about two per cent., and might all be left in without injury to the nutritive quality of the bread.

Secondly. The grain is now placed in a vessel filled with water, at a temperature of about seventy-five degrees Fahrenheit, in the proportion of about

two parts by weight of water to one part of wheat, so that there shall be a certain quantity of water above the grain; to this water is to be previously added one part of half-dry yeast and five or six ounces of glucose to 200 parts of water. The ferment in the water acts gradually upon the wheat, and after immersion for twenty or twenty-four hours, according to the nature of the grain and the temperature, the wheat will have absorbed from fifty to seventy per cent. of water, and be ready for panification. The water will now have become of a reddish color, having extracted an amount of the coloring matter from the remaining bran, and is allowed to run off; thus another step has been made towards the bleaching of the dough.

Thirdly. After the wheat has been again drained, it is made to pass through one or more pairs of rollers, and, being of the consistence of cheese, it is easily reduced to a paste; by this operation the bran of the second skin has become excessively finely divided, and equally mixed throughout the whole mass. This being done, and the dough placed in a trough, the proper amount of salt to give flavor to the bread is dissolved in water and poured over the dough, and, should the wheat not have absorbed more than fifty per cent. of water, fifteen to twenty per cent. more is now to be added, and the whole is well mixed by being turned over two or three times by hand. The dough is now treated in the ordinary way, rolled and made up into lumps, and left to ferment until the right moment for putting it in the oven.

There is certainly nothing unreasonable in this process; the machinery is of the simplest kind, and the processes such as any baker could carry out without difficulty. It well deserves a trial, and, although the wish has an ungrateful sound, we heartily wish that M. Sezille may have found the method of dispensing with the use of mills, millstones, bolting machines and flour sack, and even with the jolly miller and his men.

MEDICINE IN THE DARK AGES.

FROM the fall of the Roman Empire until the revival of letters in the sixteenth century, the treatment of disease throughout Christendom was chiefly in the hands of the monks. Their influence on the progress of therapeutics, considered as a merely mundane art, must be set down as on the whole unfavorable. Charms and amulets were more trusted than medicines. Yet the monks did not altogether fall in with the superstitious ideas of the times. In connection with the monastery was often to be found the well-managed hospital, and the garden stocked with plants reputed to possess healing virtues. Doubtless the monks were the means of saving many lives in the dark and troublous times of the middle ages, when the monastery and its hospital often formed the only refuge for the sick and the wounded.

In these ages, light gleamed from an unlooked-for quarter. The Arabians, whose conquest and sway over Western Asia, Northern Africa, and Spain, belong to the history of the period intervening between the seventh and the thirteenth centuries, after settling down in the fair regions they had won from the Christian by the sword, began to cultivate the arts and sciences. They founded schools and collected libraries, and the works of Aristotle, Plato, Euclid, Hippocrates, and Galen, were translated into Arabic, by Honair, a physician of Bagdad (the capital of the Arabian or Mohammedan Empire), in A.D. 870. Besides preserving from destruction the writings of the great teachers of Greece, the Arabs made some improvements in the art of medicine. For example, they substituted mild aperients, such as senna and rhubarb, for the terrible hellebore (the purgative of Hippocrates), made addi-

tions, such as musk, to the *materia medica*, and were the first to employ distillation, as well as chemical analysis.

One of the most distinguished among the Arabian physicians was Rhazes, who wrote twelve books on chemistry, and a work on the small-pox, a disease he was the first to describe. His pathology and therapeutics he took from Galen, of whom he seems to have been a devoted disciple. Of even greater renown than Rhazes was Avicenna, called Scheikh Reyes, or the Prince of Physicians. He was born at Bokhara, and at an early age was celebrated for the extent of his acquirements in all branches of knowledge then taught. He translated the works of Aristotle into Arabic, from which, in the twelfth century, Michael Scott, known in Scottish tradition as the "wizard," and whose tomb is still to be seen in Melrose Abbey, translated them into Latin. A singularly circuitous way was this for knowledge to reach the remote isles of Western Europe. After a chequered life, being at one time a vizier, at another in prison or exile, he died in the year 1036, at the age of fifty-eight. His system of therapeutics in no way differed from that of Galen (who died about A.D. 200), but the literary talent displayed in his writings caused them to be for hundreds of years an indisputable authority in medicine.

Contemporary with Avicenna flourished the Arab historian of medicine, Haly Abbas, surnamed Magus, on account of his great learning, whose great book, of which a Latin translation still exists, was called "Almalecus," or the royal work. A like or even greater renown in medicine has fallen to the lot of Avenzoar of Seville, and Averrhoes of Cordova, two of the most learned men and greatest ornaments of Spain under the Saracens. Later than these flourished Abulcasis, also a distinguished medical writer and practitioner.

The credit due the Arabians amounts to this, that they made some not unimportant additions to the *materia medica*, described some new diseases, *e.g.*, small-pox and measles, and prevented the knowledge and wisdom of the Greeks from perishing amid the great historic cataclasm involved in the breaking up of the Roman Empire, and the overflowing of Europe by the tide of Northern barbarism. The barbarians, whether Goths, Vandals, Huns, Visigoths, Franks, or Lombards, while, through fear of disease, they set value upon the captive physician, and often lavishly rewarded his services, had neither time, taste, nor opportunity to cultivate the science and art of medicine, nor in the turbulent scenes which they everywhere created was it possible for the class of learned men to be perpetuated. It was strange that the healing art found a patronage from a faith based on the power of the sword, which it could not then find from that founded on the words of Him who is justly called the Great Physician.

An exception to this state of things in Christendom was latterly — that is, from the twelfth to the fifteenth centuries — to be witnessed in the Italian republics, whose magnificent cities were the homes of whatever learning and art had survived the barbaric deluge. Milan, for example, in the days of its greatest glory, is said to have contained two hundred physicians, many of them men of good family and of high intelligence and education. An Italian physician, Dr. Giovanni di Proceda, made his name prominent in connection with the political movement rendered ever memorable by the "Sicilian Vespers." One medical school, that of Salernum, near Naples, attained to great and deserved renown. It was called the "City of Hippocrates," and its foundation consisted of ten doctors or professors. It was long the only Christian school of medicine in Europe worthy of the name; for though here and there, in university or cloister, might be entombed some prodigy of learning, and such a marvel of genius as Roger Bacon might create astonishment and awe, the general state of medical science was deplorable, as was evidenced by the ravages of the "sweating sickness" and other plagues and epidemics which swept over and decimated the

helpless populations. But by-and-by a better era dawned on the West, fraught with new health, to the great masses of the people.

It was at the close of the period now referred to that a singular character appeared on the stage of medical history — Paracelsus, who was born at Einsedeln, near Zurich, in Switzerland, in 1423. His father was superintendent of the convent hospital at Einsedeln, and from him Paracelsus received the rudiments of his education. What further instruction he received is not known, but eventually he set out upon his travels and visited Italy, Germany, and Sweden, and even extended his peregrinations to Asia and Egypt.

He is conjectured to have maintained himself by working "wonderful cures," and there seems to be no doubt that he had made some attainments, if not discoveries, in chemistry. At the age of thirty-three he boasted of having cured thirteen princes whose cases had been declared hopeless. He became Professor of Physic and Surgery in the University of Basle in the year 1526. Beginning his career by publicly burning the works of Galen and Rhazes, he lectured to his class, in German, on the incompetency of reading, and the necessity of travel and practice to make a physician. His style and opinions did not win the respect of his pupils, and the class-room was soon deserted. This, with a quarrel in which he involved himself, compelled his retirement from Basle. He again set out upon his travels, and wherever he went made the doctors his enemies by denouncing them and their system, and performing his "wonderful cures." At Salzburg this led to fatal consequences; for Paracelsus, after one of his tirades, was assailed by the doctors' servants, pitched out of the window at an inn, and had his neck broken by the fall. This happened in 1541.

The impression which Paracelsus, in spite of his errors and eccentricities, made upon the men of his time, was due to his audacity in exposing the defects of the medical systems then in vogue, and insisting on the merits of his own methods. The Galenic doctrine he denounced with unmitigated scorn, nor did he reverence the memory of Hippocrates. The popular superstitions connected with medicine he brushed aside with a sweep of common sense. But he was more successful in demolishing old doctrines than in building up new. His own system, so far as it can now be ascertained, was extremely mystic and vague.

One feature of it can be made out distinctly, namely, that he regarded disease not as a mere change in the humors of the body, but as an entity — an invading monster which must be driven out by a superior antagonistic power. Every disease, he maintains, has its own proper arcanum or antidote. With this doctrine he mixed up certain mystic notions about the "spirit" of the remedy.

To hit upon the antidote for each disease, Paracelsus maintained that the physician should have a knowledge of *philosophy*, *astronomy*, and *alchemy*: but of the meanings which he attached to these words, the limits of this paper forbid detailed explanations. Suffice it to say that by philosophy he meant the powers of nature; by astronomy, the relations of the heavenly bodies to the human constitution; and by alchemy, virtually pharmaceutical chemistry, which provided, as he thought, antidotes to disease in great number. His principal remedies were, however, mercury, opium, and antimony, which still play an important part in medical practice. Whether any single medicine, or a compound of several, constituted his *elixir vitæ*, is not so certain as that it failed to prolong the life of those who trusted in it.

Opium Habit.—A patient compares the sufferings incident to the opium habit to nothing less than "*a compound, double-distilled and highly concentrated extract of rheumatism, gout, neuralgia, and itch; with head-splitting — stomach-nauseating — intestine-twisting — limb-tearing agony.*"

LEPROSY.

Editors of "Good Health":

Gentlemen, — It is quite natural that the articles on "Leprosy" which I contributed to the last two numbers of your Journal should have excited curiosity, discussion, and even doubt, as to whether the statements I made in reference to the so general prevalence of this fearful disease over the world were sufficiently supported by known facts. I therefore would request of you to print the following "Sketch of the Geographical Distribution of Leprosy at the present Time." It was compiled by Dr. Milroy, Secretary of the Leprosy Committee of the Royal College of Physicians. The great bulk of the statements is derived from the invaluable work of Dr. August Hirsch, of Berlin, entitled "Handbook of historical and geographical Pathology."

Respectfully your obedient servant,

B. Joy Jeffries, M. D.,
15 *Chestnut St.*, *Boston.*

THE chief seats of leprosy in recent times continue to be the same regions of Africa and Asia where it was originally seen, and where it is known to have been most common in remote ages. It is still endemic in Egypt, along the valley of the Nile, and on the shores of the Mediterranean and Red Seas. Aubert Roche, and other recent visitants of the country, confirm the statements of Bruce and Larrey at the end of the last century. In Abyssinia it is said to be frequent, not only in the plains, but also in the mountainous plateaus. Mungo Park, as well as the earlier traveller Moore,* found it among the inhabitants of Darfur in the interior; and Daniell states,† that the slaves brought from Soudan to the west coast of the continent, are frequently affected with the disease. It is common along the whole of the north coast of Africa. That it is frequent in many parts of Algeria, appears from many recent notices in French periodicals. Morocco and Senegambia have long been known to be infested with it; and there seems to be scarcely a district along the west coast which is entirely exempt.* At the Cape of Good Hope, it is common among all the native races and tribes; the inhabitants of the great sandy plains are more subject to it than those of the fruitful and cultivated districts. Whether the disease is prevalent along the east coast of Africa, we cannot say, from want of evidence; but that it exists as an endemic in Madagascar, and in Mauritius and Isle of Bourbon, is perfectly well known.

The Asiatic continent appears to be nearly, if not quite, as much infested with leprosy as the African. In Syria, especially in the southern districts about Beyrout, Jaffa, and other places in Palestine,† it is still common; and even some of the lofty districts of the Lebanon are far from being free. In Arabia, too, it continues to be endemic;‡ and the same may be said of various parts of Persia, where the poor sufferers are compelled to herd together in miserable hovels, at some distance from the towns, and are generally left in the greatest wretchedness.§ Burnes

*Travels into the Inland Parts of Africa, 1738.

†Sketch of the Medical Topography of the Gulf of Guinea, 1842.

*Dr. Clark, in Vol. 1, Transactions of the Epidemiological Society, 1864.

†"Just outside the town (Ramley, between Jaffa and Jerusalem,) sat a group of dirty Arabs, in rags. They rose from their stony seats, and advanced, holding out little tin cups for alms. Their faces were so disfigured that they scarcely looked human; the eyelids and lips of some were quite destroyed, while the faces of others were swollen into frightful masses. Leprous families intermarry, and sometimes the immediate offspring are free from any appearance of the disease; but it is sure to revive in the succeeding generation. Some of them appear quite healthy till nineteen or twenty years of age; but they feel themselves a doomed race, and live quite apart from the rest of the world, subsisting almost entirely on charity; for often their fingers rot off, and their hands are rendered useless"—*Domestic Life in Palestine*, 1862.

‡"The list of cutaneous disorders is long and loathsome, from *lupus exedens* to simple *impetigo.* Leprosy abounds; sometimes it assumes the blotchy and not dangerous form called 'baras'; sometimes it is the hideous 'djedum,' under which the joints first swell, then break out into sluggish, yet corroding ulcers, and at last drop off piecemeal. However disgusting, it does not render its victims legally impure (as was the case with the Jewish leprosy), nor does any one believe it to be contagious."—*Palgrave's Journey through Central and Eastern Arabia*, vol. 2, p. 3; 1865.

§Herodotus says:—"Should any citizen have a leprosy or white eruption, he is not allowed to enter into the city, nor to have any intercourse with other Persians; and they say that he suffers because he has sinned against the sun. And should it be a foreigner who is attacked by one of these diseases, in many places they go so far as even to expel him from the country."—*British and Foreign Med. Chirurg. Review, for April* 1864, p. 382.

and other travellers mention the frequency of the disease in Bokara; it is known there under the name of "mukkow" and "kolee." It is common also in Ladakh, Cashmere, etc. In India, one of the most ancient seats of the malady, it is still widely and extensively prevalent. The sea-coast districts, it is generally believed, are more afflicted with it than the inland. In many parts, however, in the interior of the country it is very common, as at Patna, Tirhoot, Ramgur, and various places in the north-western provinces. Some estimate of the prevalence of the disease may be formed from the statements of Dr. Morehead, that in two years, 1851 and 1852, there were received into the Leper Hospital at Madras 212 patients, and that 391 were admitted into the Bombay hospital from 1848 to 1853.* The statement made by some persons, that the disease, which attracted considerable notice in several of the southern districts of the Madras Presidency, had been introduced by negroes from the coast of Africa into Tranquebar, is very questionable.

Leprosy is very frequent in Ceylon, and especially in the southern parts of the island. It is stated to be much more common along the sea-coast than in the interior; in the hilly districts it is believed to be rarely met with. The disease is said to be rare in Burmah; the unhappy sufferers are treated as if they were criminals, rather than as the victims of a cruel malady. From the official report of Drs. Ward and Grant on the Medical Statistics and Topography of Malacca, 1830, it appears that leprosy was so prevalent among the poor, that Government deemed it proper to establish a hospital for the reception of the sufferers. In Java, Sumatra, and other islands in the Indian Ocean,* leprosy abounds; and some accounts state that it is by no means confined to the inhabitants of the sea-coast. Several recent writers, as Lockhart, Hobson, Wilson, etc., have noticed the great prevalence of the disease in China, where lazar houses are as numerous and crowded in the present day as they used to be in England, and other countries of Europe, before the fifteenth century. Whether it extends to the northern provinces of the land, we are unable to say.† A Russian writer has recently stated that it is not uncommon in Kamschatka. In respect to all these remote countries, it deserves to be remarked that it seems far from improbable that various secondary and tertiary forms of syphilitic disease may often be confounded with true leprosy.

It seems uncertain whether the malady has been recognized among the inhabitants of the Australian Continent, or of the Australasian Archipelago. The endemic disease among the New Zealanders, described by Dr. Thomson, in 1854, appears to be of a leprous nature.

Although leprosy has been but little known in Europe generally since the latter part of the seventeenth century, it nevertheless continued to exist in certain localities in different regions throughout the following century; nor has it even yet disappeared from them as an endemic disease. The southern regions near to the frontiers of Asia are still considerably infested with it.‡

*Dr. Morehead, in his valuable "Clinical Researches on Disease in India," 2d edition, 1860, remarks: — "Leprosy is common in India. The numbers received into the Leper establishment at Calcutta are unknown to me; but I visited this institution in 1853, and found the accommodation and arrangements altogether inadequate for the comfort and well-being of those afflicted with this sad disease. * * * The system followed in the Madras Leper Hospital, at the time of my visit, under the judicious management of Dr. Hunter, formed a pleasing contrast to that of Calcutta. The patients were classified according to their previous habits and position in life. Books were provided for the educated, and gardening and other light occupations conducive to health and happiness were encouraged. The arrangements for lepers in Bombay, inferior to those at Madras, are superior to those at Calcutta. There is accommodation allotted for them in the Jamsetjee Jejeebhoy Dhurmsala; and, under exacerbations of the disease, they are received into a ward of the Jamsetjee Jejeebhoy Hospital appropriated for the purpose."

*Sir John Bowring remarks, in his "Visit to the Philippine Islands," 1859, that "Elephantiasis, leprosy, and St. Anthony's fire, are the scourges of the Indians, and the wilder races of the interior suffer from a variety of cutaneous complaints. The biribiri is common andfatal.

†Dr. Scherer, in the recent "Voyage of the Novara" round the world, states that "common as leprosy is in Southern China, it is unknown in the North; its area of manifestation seems to be confined within the tropics. Many Chinese in good circumstances when attacked, have, it is said, removed to Pekin, where after two years' residence they lost all trace of the disease. It broke out anew, however, soon after their return to the south." — 1863-4.

‡Many of the cases of the disease seen in Constantinople are in persons from different places in

In many of the islands of the Ægean, both Turkish and Greek, it is far from being uncommon at the present time. In Crete it prevails to a very considerable extent, nor is it altogether unknown in the Ionian group (Hennen particularly mentions Cephalonia), and, according to Danielssen and Boeck, in Malta. In Greece, where the disease is regarded as a legal ground for divorce in married persons, the localities said to be most affected with it are certain districts of the Peloponnesus. Attica and Bœotia are not entirely free. In 1840, the number of lepers throughout the kingdom of Greece was stated, in an official document, to be 161; and in 1851 the number was set down at 350. This apparent increase of the disease was probably due to the inaccuracy of the earlier return.*

As to what extent it prevails throughout Turkey, no information exists. It has been asserted that it is unknown in Wallachia. On the other hand, it is notorious that the south-eastern provinces of European Russia are more or less extensively affected, along the whole of the vast region extending from the Crimea by the shores of the sea of Azof, and by the Caucasus, away to Astracan on the Caspian. It seems to have been endemic for centuries past among different tribes of the Cossacks. In various localities also in the Baltic provinces of the empire, as in Courland, Esthionia, and Finland, it is known to exist, and Meyer states that it is not confined to the population on the coast.

In Sweden, where the malady was far from being unfrequent at the close of last century and in the early years of the present one, it has, according to the testimony of Drs. Huss and Berg, of recent years in a great measure disappeared. The localities where it was most common seventy years ago were the districts of Angermanland, Medelpad, Helsingland, Upland, and Bohuslan. Within the last thirty years, there were twenty-nine inmates in the Leper Hospital at Hernosand, independently of other cases of the disease scattered over the district. Since then no fresh patients have applied for admission. In the district of Medelpad, too, where the malady is believed to have been endemic for centuries, it has become very rare; and in Helsingland, which was formerly one of the chief seats of leprosy in Sweden, the cases are now only solitary and sporadic, where once they were numerous and common. The same may be said of the districts of Upland and Bohuslan. The disease has lingered longest along the coasts of Abyfiord; but there, too, it is much less frequent than formerly. In all these different districts, the localities chiefly affected seemed to have been the deep valleys and the shores of the fiords, which are liable to frequent inundations.

Norway has continued to be very much more infested with the malady than Sweden. It is still endemic there, under the name of Spedalskhed, along almost the entire coast from Stavanger in the south, to Finmark in the north, between the 59th and 72d parallels of latitude; and, within the last twelve or fifteen years, it seems to have been extended somewhat more into the interior of the country in certain districts. In 1846, the number of persons known to the public authorities to be affected with leprosy, throughout the country, was 1,122; but the actual number was, doubtless, much greater, as very many cases of the disease in its early stages were, it was notorious, studiously concealed by the relatives of the sufferers, as well as by the patients themselves.*

Asia Minor, where the disease is probably much more frequent than on the European side of the Bosphorus.

* "In Greece leprosy is endemic: the statistics lately published by Dr. Dekigalla, of Syros, show to what extent it prevails. According to this author, the lepers are left in a sad condition, some living in solitary huts or caves, and others herded together in lazar houses of the most wretched description." — *London Medical Review*, 1861.

* Professor Daa, at the meeting of the International Statistical Congress held in London in 1860, said: — "The most remarkable affliction in my country is that particular disease, elephantiasis, which has spread all along the fishing districts, and in the damp localities along the coasts, and only there; it does not enter the mountainous parts of the country, nor in general does it penetrate to the interior. The number of persons afflicted with the disease in 1858 was 2,087."

Professor Daa added: — "Diseases of the mind are likewise more prevalent in Norway than in many other countries, and several reasons have been assigned for this deplorable fact. It is the same, I believe, both in the islands and the mountains, where the people live very simply, and with very

While the malady has, since the end of last century, disappeared from the Shetland and the Faroe Islands, it is still met with in Iceland, although to a much less extent than formerly. A century ago, the number of lepers there was set down at 280; in 1838, the number was estimated at 128; and ten years later, Schleisner, who officially visited the whole island, found only sixty-six persons affected with the disease. A good many, however, of the patients had been, it was believed, cut off by the epidemic of measles which had prevailed and was very fatal the year before, 1847.

little change of food." Hereditary transmission appears to play an important part in respect both of mental disorders and of elephantiasis among the Norwegian population.—*Report of the Proceedings, etc.*, p. 29; 1861.

CONSUMPTION.

BY CARL BOTH.

HISTORY.—PART I.

ALMOST every person who has listened to the statements or read the accounts of any two travellers who have passed over the same route, will have noticed that their views and opinions of the same things which attracted their attention, are sometimes so widely different as to present the appearance of contradiction, and perhaps call in question even, the veracity of both. But, when all the circumstances connected with the formation of the views of each are clearly understood, it may be seen that each, from his own stand-point of observation, has spoken of things as they *appeared* to him, and that instead of contradiction, the statements of the one constitute the *complement* of the other; or that the *facts* of each gave rise to trains of thought which led to different conclusions. Two persons may look at the same object, and yet, as the result of difference of tastes, or of culture, see two distinct and different things; this is true in politics, the arts, science, and in fact throughout the realm of thought. Take a diamond, for example. Its rarity, beauty, and brilliancy, call forth the admiration of one; its cutting and purity of color, the calculation of another, who has an eye only to its possible value; the peculiar processes of nature by which this pure crystallized carbon was produced, occupies the attention of a third; the various uses to which it is applied in the mechanical arts, come up for consideration by a fourth; while a fifth may be able to discover nothing but the unrequited toil, misery, and lacerated backs of the slaves who are compelled to labor under the scorching sun of the tropics, and the lash of the overseer, to obtain them, and so turns away in disgust. But a just appreciation of the value of the diamond, involves a knowledge not only of one class of facts connected with its history, uses, etc., but of all of them;—and so of every class of subjects which come up for investigation.

This is especially true relative to Consumption—a disease which probably presents more numerous difficulties, even to the greatest minds and most advanced thinkers of the age, than any other within the range of science. It will therefore be necessary to take a brief view of the various opinions which have been held at different periods, commencing with its earliest known history, 400 years before Christ.

Such a recurrence to the early history of this terrible scourge, will be found not only interesting and useful, as a means by which to trace to their original sources our own preconceived opinions, and those of others now prevalent relative to this subject, but of acquiring such knowledge in this connection as will lead to a clear understanding, and the formation of a correct judgment in reference to it.

From 460 to 377 before Christ, our old friend Hippocrates lived and flourished. His medical opinions relative to Consumption, governed the world without any material change until A.D. 1614, a period of 2,000 years. And even now, at this day, the same views are held by a large number of the medical profession, and to a considerable extent govern the public mind.

Hippocrates distinguished between *five* kinds of Consumption. The *first*,—what is now known under the name of *chronic pneumonia;* the *second* was caused by mucus dropping down from the head into the lungs; the *third*, by venous bleeding; the *fourth*, by a collection of blood, pus, and mucus, in the pleural cavity; and the *fifth*, and last, were abscesses of the lungs. From this, it would appear that Hippocrates had about as good a *general* knowledge of this subject as most men of the present day. Nor will the comparison suffer materially, if we consider the common-sense treatment which he employed for the different kinds of Consumption enumerated; in fact, from a common-sense stand-point, it will frequently be found to have been superior. His descriptions and distinctions are very much superior to those of the men who came after him, as we shall learn further on; and there are doubtless many flourishing practitioners, to-day, who have less real knowledge of Consumption, than was taught, by Hippocrates, more than 2,000 years ago. Whenever, during the past, anatomy has been encouraged and progress made in this direction, the knowledge of Consumption has advanced; but when anatomy has been discouraged and suppressed, and experience, speculations, sophisms, and mysticisms have taken its place, such knowledge could make no advancement, but, on the contrary, much of that, previously gained, was lost.

There existed at Alexandria, 320 years before Christ, a Medical School, the writings and teachings of which, however, have been mostly lost. We find a few remarks on this subject in the writings of Celsus, Ephesius, and Galenus. Celsus first used the word *tubercle*, but without attaching any particular meaning to it. From the above sources, scanty though they be, we find enough to convince us that the knowledge then possessed was most remarkable for the time. They had already discovered the existence of lymphatic vessels, which was afterwards lost, and only rediscovered nineteen centuries after, viz., in A.D. 1622. Claudius Galenus, a pupil of the Alexandria school, and a physician in Rome under the Emperors Marcus Aurelius and Commodus, A.D. 131–201, seems to have known less about Consumption than Hippocrates; but what we find in his writings, corresponds very nearly with what Hippocrates taught. He only speaks of ulcerated lungs;—and of sending his patients

to places where a *dry atmosphere* prevailed, for the purpose of drying up the ulcers. He also prescribed remedies adapted in his judgment to accomplish the same object. Hence physicians who recommend to their patients a change of climate, as from moist to dry, having in view the removal of any lung disease, are but following in the steps of Galenus of 1,700 years ago, and a practice which of itself is more than 2,000 years old; but such is the world. The history of one period repeats itself in another. The opinions and practice of one age or generation are discarded, only to be revived again as something new, after having been lost sight of, and forgotten, it may have been, for centuries. It should, however, be borne in mind that it does not follow, as some would seem to suppose, that a moist atmosphere is *productive* of tubercles, simply because that Galenus, and other medical practitioners, since his time have sent their consumptive patients to a dry atmosphere for cure. But it sometimes happens, through a misapprehension or misunderstanding of words and their origin, that from a common-sense idea, theories and practice of the very opposite character arise.

From Galenus, A.D. 131–201, down to the 16th century, a period of 1400 years, medical science made no progress whatever. During this period, practical anatomy was not only discouraged, but absolutely forbidden, on penalty of death. Galen's works were translated and retranslated, each succeeding translation being a little worse than the former, and all worse than the original. But in time, through men like Jacob Sylvius, 1500; Andreas Vesalius, born 1514; Gabriel Fallopia, 1523–1562; Eustachius (who died 1574); William Harvey, 1578–1657; and others following them, anatomy was not only revived, but developed and established as a science. On the revival and establishment of anatomical science, a new era dawned, and a fresh impetus was given to the development of medicine in general, and of the causes and cure of consumption in particular. Franciscus Deleboe Sylvius, 1614–1672, was the first author of this period who revised and advanced the ideas of Hippocrates and Galenus. He called the hard bunches which he found in the lungs of consumptives, tubercles; and distinguished between large and small ones. He is the first who speaks of the softening of these hard tubercles, thereby forming cavities and destroying the lungs. He also speaks of consumption of the blood, which he regarded as one kind of Consumption. The second kind he thought was originated by bad nutrition, causing tubercles. The third kind he demonstrated as degenerated glands, and through this theory he originated the idea of the relation between Scrophulosis and Consumption; a distinction which afterwards caused much confusion and many errors.

The views of Sylvius were followed, and very much enriched, by Willis, 1622–1675, Bonnet, 1620–1689, and Manget, 1700;—the result of *post-mortem* examinations made by them during these periods.

The views of Hippocrates, Galenus, and Sylvius, however, underwent no material change until Morton's famous book upon Consumption appeared in London, 1689. He developed views which were not

only superior to those of his own time, but which maintained their ascendancy for more than one hundred years. He says, Consumption is a wasting away of the whole body, having fever connected with it, and is caused by incorrect conditions of the lungs, with consequent ulcerations of them. The acid and diseased blood-water exudes into the soft tissues of the lung, obstructs it, causes inflammation, and final ulceration and decay. He distinguishes four different *stages* of this process. He also distinguishes Consumption from Catarrh, the former by a dry, and the latter by a moist cough; and defines an original (inherited) and an accidental (acquired) Consumption. He is the first to advance the theory, and positively to maintain the existence of *only one kind of Consumption*, which invariably originates from tubercles, or knots. By this theory he completely upset the old ulcer theory of former authors. This advance, however, was not accepted by his contemporaries, and consequently all further progress was not only arrested for more than one hundred years, but the advance, already gained, lost sight of, and forgotten, until revived and re-established by Bayle, in 1810.

From 1624–1689, Sydenham kept up the views of Hippocrates, as also did Frederick Hoffmann, 1660–1742, who, with slight variations, made ulceration the basis for Consumption. Boerhaave, 1668–1738, the most famous physician of his time, advocated the views of Galenus. Van Swieten, 1700–1772, was a follower of Boerhaave, whose pupil he was, and sought to make the ideas of Hippocrates, again, the prominent ones. Another pupil of Boerhaave, Auenbrugger, 1722–1809, made the discovery of *percussion of the chest*; a method by which, through thumping or tapping upon the chest, the more or less high and sonorous tones indicate a more or less density and degeneration of the lung-tissue. Although, through this discovery, which is now used by every intelligent physician, he made his name immortal, he added nothing new to the knowledge previously acquired on Consumption. Great physicians, like Sauvages, the immortal Morgagni, Stark, Reid, Cullen, Kortum, Baume, Hufeland, Portal, and others, made efforts to place medical science in relation to consumption in an advanced position, but with the exception of the discovery of Baillie, who demonstrated the existence of tubercles in other organs as well as in the lungs, no marked advance was made. Vetter, the anatomist, an independent thinker, and uninfluenced by the dominating opinions of the day, first distinguished between Phthisis of the lungs (inflammation and ulceration) and Tuberculosis, either inherited or acquired. And here it may be remarked, that after Morton established the theory that all Consumption originated through tubercles, in opposition to that of Hippocrates, of inflammation and ulceration, two distinct parties arose. The first considered that tubercles were originated by a *specific* something; the other admitted nothing of the kind, while Vetter, who, as we have already seen, had made some advance, accepted both; but Bayle (1774–1816) very soon gained such reputation as to overshadow him. Like Vetter, Bayle worked as an independent thinker, who would not be bound by the opinions of others, and the

result of his investigations gave to the world the tuberculous theory, in the further development and perfecting of which, the name of Lænnec became exceedingly famous. Bayle demonstrated Consumption as a general chronic disease, originated by a special principle (the tuberculous), and which had its seat principally in the glands, especially the lungs. He positively denied the doctrine of Hippocrates, that Consumption was caused by inflammation; but the greatest merit of Bayle consists in his discovery of what is now called miliary tuberculosis. Lænnec immediately followed Bayle, and succeeded in sweeping away all the previously existing theories for a period of fifty years, although his opponent Broussais fought hard for the old inflammation theory of Hippocrates, but without success. Lænnec not only explained all Consumptions, but Scrophulosis also, as nothing but the consequence of the tuberculous specific principle (specific new formation), which was inherited in most cases, but occasionally acquired. Lænnec supported his *theory* by *Auscultation*, a method which he himself discovered, by which, through the use of the ear, we are able to ascertain certain diseased conditions of the lungs with absolute certainty. He gave a most remarkable description of the gray and of the yellow tubercle, pointing out the peculiarities and characteristics which distinguish them; and to the doctrine of lung diseases he gave the very great importance which they at this day command;—in fact, until within a very short period he was regarded as having carried the pathology of Consumption to the highest degree of perfection.

Lænnec, though in such high repute as to command the views of physicians throughout the world, had very strong and remarkable opponents. His most dangerous adversary, after Broussais, was Andral, who demonstrated beyond a doubt the existence of an inflammatory Consumption, of the cheesy degeneration of thickened pus, which have now completely superseded the views of Lænnec. But they had hardly been brought under discussion, when Louis came to their rescue, and through his classical work entitled, "Recherches Anatomiques, Pathologique et Therapeutiques sur la Phthisie," re-established them, and he so completely commanded the opinions of physicians everywhere, that even names like Lallemand and Cruveilhier, who supported Andral, were not able to shake the specific tubercle theory sufficiently, to cause it to be given up by physicians in general.

A better and more general view was demonstrated by Schöenlein. He made a marked and positive distinction between Tuberculosis and Scrophulosis, both of which he tried to define anatomically. He added a great many valuable suggestions, but they were of little consequence to a majority of the physicians who at this time were blindly following the views of Lænnec. On the other hand, Rokitansky again demonstrated Tuberculosis and Scrophulosis as synonymous. Prominent among the authors of this period were Cannstadt, Vogel, Engel, Alison, Baron, Addison, Carswell, Clark, Stokes, Lebert, etc., all of whom made additions of more or less value to the knowledge previously acquired, which, however, was only pro-

ductive of the greatest confusion of opinion; so much so, that when a physician made use of a word, he had first to explain its meaning according to the author he used, in order to be understood. In the meantime the chemists Preuss, Simon, Lehmann, Scherer, Gavarret, and many others, made most exact analysis of sputa, blood, etc., but were not able to clear up the mystery. The more facts that became known, seemed only to add to the confusion of ideas and opinions. While at a previous period there were but two leading opinions, that of Hippocrates (inflammation and suppuration), and that of Morton and Lænnec (specific tubercle formation), we have during this period to distinguish between Phthisis, Scrophulosis, tuberculization of pus, tuberculous pus, gray infiltrations, yellow tubercle, gray tubercle, cheesy matter, primary and secondary affections, protein-exude, fibrous, croupous, albuminous tubercle, tubercle granules, granulosis, tubercle-corpuscles, etc., etc. The different kinds of Consumption were different with almost every author, and a greater confusion of facts with opinions can scarcely be imagined; and consequently the simple views of Lænnec were still held by a large number in preference to the extreme complications of others.

In 1850, Reinhardt succeeded in maintaining the position that Lænnec was wrong; and going back to the old opinion of Hippocrates, that tubercles were nothing but the result of inflammation, established the theory that all forms of Consumption were only a chronic pneumonia, with different appearances. The definitions of Virchow, who immortalized his name as the originator and author of cellular pathology, directly made their appearance. As before stated, anatomy was the only basis of absolute progress for science in this direction; but physicians at that and previous periods, for the most part knew little or nothing about it, because it was easier for them to accept the then established principles than to devote themselves to a hard, and, at times, an unthankful study, which sometimes had to be prosecuted under circumstances of very great difficulty; and hence they seldom, if at all, employed or turned to practical use the advances which had been made. They might speak of a discovery in the highest praise, but to turn it to practical use, were either unable or unwilling to take the trouble. Like many of more recent date, they doubtless considered themselves in possession of all necessary and sufficient knowledge so long as they retained what they had learned from others; though, for the most part, nothing but the thoughtless tools of opinions, of the value of which they were unable to judge. Hence the opinions of the oldest authors continued to be the leading ones in practice, notwithstanding the progress which had been made. The advances of anatomy, the meanwhile, became so marked, that something must needs be done, if nothing more than to change the outside coat of the thing. Anatomy had shown in the clearest manner, and by facts the most undeniable, that the old views were wrong; but instead of studying anatomy and making themselves masters of the situation, physicians went into speculations, and new ideas sprang up like mushrooms. There was no absurdity so great, or

nonsense so trifling, that it could not find a place in the books of famous physicians; and as each endeavored to defend his own absurdities and nonsense, there was nothing but war in connection with the various points at issue, thereby causing a state of confusion which gave to speculative charlatans, as well as to honest men, an excellent opportunity, which they did not fail to improve, for reaping a large harvest. Homœopathy, mesmerism, hypnotism, eclecticism, electricism, Rademacher's theory, and all sorts of wonder establishments, with their thousand and one specifics for each and every disease that flesh is heir to; with water-cures, mineral baths, air baths, etc., etc., each gathered to itself a share, and filled its garners with the spoils.

To distinguish those practitioners who declined, or were too independent in modes of thinking, to enroll their names as members of any particular school of medicine, Hahnemann, who contended that the principle upon which medicines were employed by these men, was to produce effects different from those resulting from disease, making use of two Greek words, which signify "other suffering," invented and applied to this so-called principle the term "allopathy," though it would have been difficult to find any two of them who held the same opinions.

Anatomy had made manifest the errors of the old systems, but had failed to substitute anything better, and, as a consequence, the very best physicians stood almost helpless, not knowing what to do with their patients; such was the chaos in connection with facts, opinions, and nonsense existing, when Virchow appeared upon the stage, bringing order out of confusion, sweeping out this Augean stable, and revolutionizing the whole practice of medicine. Gigantic and impossible as this work would seem to have been, it has nevertheless been so far accomplished as to influence and modify, to some extent, at least, the medical practice of the world, even where his name is not known or his authority acknowledged. In Germany, the era of medicine as a positive science has, as it were, but just commenced; while in France, England, and America, the foundations are scarcely laid, the discoveries of Virchow being comparatively unknown, and put to a practical use by none. But the old pathology (the science which has for its object the knowledge of disease) has been undermined, and is being superseded, slowly, but nevertheless surely, by the cellular pathology of Virchow. In fact, disease itself, as an entity, has vanished, and is now known only as a machine out of order. What at one time required an elaborate explanation in *words*, the meaning of which was very frequently not well understood by those who used them, is now *demonstrated* upon the blackboard with chalk or pencil. This was not possible previously to the discovery and application of the cellular principle, and is not even now practicable to a very great extent. And although Virchow has given a solid basis to medicine, rescued it from speculative charlatanism, and elevated it to the position and dignity of an absolute and positive science, he could not completely exhaust a single subject without losing himself too much in details; and as it

requires an exact and difficult study to bring the principles and laws which he has developed, into actual practice, considerable time will yet doubtless elapse before the fruits of his labors are everywhere openly acknowledged and appreciated. Further on, the pathology of Consumption, as demonstrated by Virchow, with such additional discoveries as have been made by the writer, will be given.

In passing, we cannot omit to mention the name of Niemeyer, who has not only made many valuable additions relative to that kind of Consumption known as Chronic Pneumonia, and which comprises more than one-half of consumptive cases, but to whom also belongs the honor of having done very much to bring into practical application and use the discoveries of Virchow.

Notwithstanding that the old theories have been completely exploded by Virchow, there are men yet to be found who make every effort to sustain the views of Lænnec; more especially is this the case in France. But as they cannot directly contradict Virchow, they help themselves by creating a new name for an old thing, invent the term "granulosis," and make it appear as the name of an entirely new species. It is hardly necessary to remark that such speculations are of no consequence whatever to science. The days for the old trick of inventing new words for old and forgotten theories, thanks to anatomy, have forever passed away. But as prominent among the names of those who have taken this position, we may mention that of Lorain, Robin, and Empis (a new writer). Villemin, the experimenter, by a series of experimental inoculations, imagined that he had discovered something new. His experiments, which were subsequently repeated in England, and more especially in Germany (by Waldenburg, in Berlin), though at first sight seeming to establish the views of Lænnec, when fully understood, only go to prove the correctness of what we have to advance on this subject. Undeniable facts, with incorrect conclusions drawn from them, have been the occasion of great confusion at all times, and in all directions.

Diagnosis between Real and Apparent Death.—Dr. Laborde, in a paper recently read by him before the Academy of Medicine in Paris, has endeavored to show that the effect produced on a bright steel needle inserted into the body indicates whether death has or has not occurred. When life is present, he says, the needle, generally very soon, becomes more or less tarnished by oxidation; when, on the other hand, death has taken place, the needle, even at the end of half an hour or an hour, will retain its brightness.

The After-taste of Quinine.—In practice there is often experienced a great difficulty in getting patients to take quinine, because of its after-taste, which to some is simply unbearable, and when antipathy thus exists, combined with a difficulty in swallowing pills, the therapeutic value of an important drug is lost. We find, and the fact may not be generally known, that the mastication of some acid fruit, as an apple or a pear, will permanently remove the disagreeable after-taste of quinine. The first mouthful of fruit should be well masticated and rolled through the mouth, so as to cleanse the teeth, etc., and then ejected. The second morsel may be swallowed, when it will be discovered all taste of the quinine will be removed.

Effects of the Secretion of Tears on the Circulation of the Brain. — Mr. Lund read before the Manchester Medical Society, March 2, 1870, a paper on this subject. He related the case of a lady who, about ten years since, after hearing suddenly of the death of a son, was seized with a violent paroxysm of grief, shed tears profusely, suffered for some days from the frontal headache, and great cerebral excitement, and then recovered. Lately, this same patient received news, by letter, of the supposed death of another son abroad. The circumstances were peculiar; and when the letter was read, while all the family around were greatly affected, it was noticed that, contrary to her usual habit when much moved, she did not shed a tear. In about two hours afterwards, while sitting at dinner, she suddenly exclaimed, "Oh! my son, I shall never see him again!" and immediately she was seized with right hemiplegia. There was no other form of paralysis, and no aphasia. The total loss of power, with partial loss of sensation, in the right arm and leg remained for nearly five days, after which the paralysis gradually ceased, and, at the end of three weeks, all traces of it were lost. During this time, it was declared by her friends that she was never seen to shed tears. The inference drawn from these facts, and from other singular cases referred to, was, that on both occasions, under the excitement of intense grief, certain parts of the brain, most probably the thalami and striate bodies, which have been called the *emotional ganglia*, were the seat of vascular congestion; that on the first occasion, this vascularity was in some way relieved by the secretion of tears, but on the second attack, the secretion of tears not occurring, the congestion of the ganglia persisted for a certain time, and this state and the paralysis were associated together as cause and effect. It was assumed that one use of intense lachrymation, as an emotional secretion, was to relieve the excessive *intra-cerebral vascular congestion* of certain parts, which, if allowed to be too long sustained, would damage the structures and cause suspension of their functions.

Tobacco for the Wounded. — There is no deprivation which the habitual, although not excessive, smoker feels so much as the loss of tobacco; and soldiers of all nations, especially of the French and German nations, smoke it. It was a standing injunction of the first Napoleon that his troops should have tobacco, and they found it of the greatest advantage in the retreat from Moscow. The soldier, wearied with long marches and uncertain rest, obtaining his food how and when he can, with his nervous system always in a state of tension from the dangers and excitement he encounters, finds that his cigars or pipe enables him to sustain hunger or fatigue with comparative equanimity. Explain it as we may, this is physiologically true; and medical officers, who would not be sorry to see the issue of a "spirit ration" discontinued, are compelled to allow that the moderate use of tobacco by soldiers in the field has several advantages. For the wounded it is probable that tobacco has slight anodyne and narcotic properties, that enable the sufferer to sustain pain better during the day and to obtain sleep during the night.

Antidote for Hashish.— As hashish has been employed as an exhilarating agent, and even as a remedy against melancholia, it is useful to know the substances which can increase or destroy its action.

Experience has proved that infusions of coffee, of tea, and of cocoa, always increase the action of hashish; and that lemon juice and vinegar, and consequently citric, malic, acetic and tartaric acids, in aqueous solution, more or less diluted, arrest its effects, and are competent to serve as real antidotes.

Women Surgeons.—There are several women surgeons in the French army, and it is asserted that they expose themselves to the greatest of danger in running to the assistance of the freshly fallen.

"VOX POPULI."

"Everybody says so, therefore it must be true." Is not this a saying with which we are most of us familiar — a popular saying, which, like many another, we accept without much examination? There is a well-known proverb which even goes so far as to assert that "the voice of the people is the voice of God"—that is, unerring. How far are these hasty generalizations justified by facts?

Well, for the last three centuries, "everybody," *i.e.* the majority of the public, has talked of Cranmer as a martyr, and of Queen Mary as "Bloody Mary." The notion of the nineteenth century is, that heretofore we have all been on the wrong tack; that the Archbishop, and others of the Reformers, were beings scarcely so respectable as Robespierre and Marat; and that Queen Mary, so far from deserving the brand attached to her name, was really more merciful than her popular sister, the "Good Queen Bess."

For some two thousand years "everybody" has talked with comfortable assurance of Romulus as the founder of Rome; it has been reserved for the criticism of the historians of the present age to discover, that in all probability Romulus was created for Rome, not Rome by Romulus; and that the hero owed, if not his existence, at least his royalty, to the imagination of the populace. So much, then, for the popular verdict on matters historical. Turn we now to the scientific world. There we find the voice of our fathers condemning Galileo, for that he did impiously avow that which is now a commonly received truth, to wit, the revolution of the earth round the sun; and ridiculing Columbus for maintaining the existence of a great western continent. Earlier yet, Omar the Arabian, in the tenth century, chose voluntary exile to escape the persecution with which he was threatened for having expressed an opinion that great physical changes had taken place on the coast of Asia; and in the time of the Roman Empire, eclipses were commonly supposed to be the fore-runners of evil, and were dreaded accordingly, the Roman soldiers beating their drums to induce the moon to resume her natural color.

Consider the opposition with which new discoveries and inventions have been greeted. Was not the art of printing supposed to emanate from the devil? And how was the introduction of gas received? From the "Gas Consumer's Guide" (a work now in press, and about being published by Alexander Moore, Boston, the advanced sheets of which we have seen,) we learn that when first introduced into London, England, it met with the most determined opposition, and that Mr. Clegg, one of the principal promoters of the reform, was for some time obliged to light the lamps himself; that even such men as Sir Humphry Davy and Sir Joseph Banks regarded it as chimerical and dangerous, and looked upon the entire movement with disfavor.

At the beginning of this century was not machinery destroyed over and over again by the ignorant people, who could not foresee the benefits it was destined to confer upon them in the future?

At the close of the ninth century "everybody" believed that the end of the world was at hand, and left their fields untilled accordingly.

These then being some of the ideas current at different stages of the world's history, we shall scarcely be prepared to endorse the truth of the proverb, or assert that what everybody says must be true; because "everybody" not unfrequently changes his opinion, and is apt to deny emphatically to-morrow what to-day he implicitly believes, and pertinaciously asserts. Warren Hastings is a case in point. In the words of Macaulay—"At the commencement

of the trial there had been a strong, and indeed unreasonable, feeling against Hastings. At the close of the trial there was a feeling equally strong, and equally unreasonable, in his favor. . . Both in individuals and in masses violent excitement is always followed by remission, and often by reaction." Obviously, then, popular verdicts lack the elements of stability, and their value decreases accordingly. Nor are the causes of this social phenomena far to seek. In the first place the *oi polloi* have something ovine in their mental composition; and it might justly be said of many another excited mob besides that of Ephesus, "the more part knew not wherefore they were come together." One sheep jumps through a gap, reckless of consequences, the rest of the flock follow in his wake. There is vastly little independence of character among them.

So is it with the multitudes. Let a man stand opposite the Sear's Building intently gazing at it with the view of discovering the crack in the marble slab supposed to have been caused by the recent earthquake, as witnessed the other day, and he will soon be surrounded by a crowd gazing likewise. Inaccurate and impressionable, let the multitude but hear the same opinion uttered by two or three persons, and, especially if they be persons of distinction, it will multiply these two or three into "everybody." Then, arguing from its own axiom, that "what everybody says must be true," it will rapturously embrace the new idea, and confidently expect something wonderful without having troubled itself to examine the ground upon which its expectation rests.

Or it fastens, maybe, upon an isolated fact, and straightway its opinion is formed; for, influenced as it is less by reason than by impulse, it is willing to take things for granted, and does not care to enter upon the rigorous and impartial examination of facts, which is necessary if one would arrive at the truth. It saves so much trouble to join in the popular cry; so pleasant is it to feel the support of numbers; for, where numbers are concerned, the sense of individual responsibility is greatly lost, though individual responsibility surely exists still.

Much of the opposition encountered by scientific discoveries has been due to the fact that the multitude, without being in the least aware of it, is, in many respects, strictly conservative, and entertains a great regard for tradition. It was quite contrary to the opinion of antiquity, that the earth should revolve round the sun, or that a continent should exist in the western hemisphere, and the multitude rejected both ideas accordingly. Again, lack of imagination is a most fertile source of uncharitable and otherwise wrong judgments. It was this which caused the destruction of machinery at the beginning of the present century, the people being too short-sighted to see the advantage in the distance. It is want of imagination which gives the sting and the animosity to religious and political controversies. Few men are capable of looking at a subject which greatly interests them, from any other than their own point of view. They cannot conceive the feelings or ideas by which their opponents are actuated, and consequently they are unable to give them credit for sincere convictions. In judging of the past, we must endeavor to conceive and realize the spirit of the past: we must imagine a state of society in which human life was held less sacred than it is in our own age, and we shall then, perhaps, hesitate before we condemn men whose conduct in our judgment seems to have been wrong.

Right judgment is then a desideratum which cannot, in the present state of civilization, be reasonably expected from the multitude; for it is not only the fruit of a large and varied intercourse with the different classes, and sections, and nationalities into which mankind is divided, but also of a liberal education, such as is the lot of few rather than of the many. Still, we may always remark that, in proportion as a man is cultivated and well-informed, his opinions will be more large minded, more unprejudiced; and we may therefore expect, that in proportion as the

masses are educated, their judgments will become more trustworthy, and many of their prejudices will disappear.

The question, in conclusion, is, how can we emerge from the narrow groove in which we have lived so long? No rules, it is true, can be laid down for the exercise of imagination; but we can both encourage and restrain her at will. The object in view is, that men may learn to look at the remote as well as the proximate results of an opinion or a discovery. The beginning, middle, and end of a consummation so devoutly wished, is education. It is better that all should be educated than that a few should be educated prodigies, and the rest absolutely ignorant, and, by reason of this penury of mind, suspicious, uninteresting and uninterested, indifferent and unimaginative. It has been said that a man's mind may be compared, at first starting, to a clean sheet of paper; gradually the mind of the educated man becomes covered with close-written matter; but the intellectual tables of the mass remain, and, alas! until their education is improved, must ever remain, innocent of a word of wisdom, save that which is worldly — clean quires, in short, of the unimpeachable foolscap.

OUR LAST JOURNEY.

MARCUS AURELIUS speaks of life as "a journey in a strange land"; and this, as well as the last journey of the body to the tomb, is one common to us all. Hitherto, in my fireside travels, I have followed a path trodden only by myself; but the way from the cradle to the grave is a road along which each one of us is passing. And how soon we begin to look back! Already, from the summit of the first hill, the road we have passed charms as much as that which lies before. Has any one ever noticed how soon children begin to say "do you remember?" The old plays in the old home, the daisies we first gathered, the old toys, are one and all "remembered." True, in youth the future is delightfully dazzling; but the past also eclipses the present. In renewed intercourse between friends once parted, and meeting farther on upon the road, the key-note is still, "Do you remember?"

I was buying soap one day in a shop at Bonn, when a funeral came down the street. That particular cake of soap — pink it was, and almond-scented — and that particular funeral were ever after connected in my mind. Even when the last small fragments were slipping through my fingers, melting away altogether in the diminutive German washing-basin, they recalled to my imagination the brown-frocked monks, the cross-bearer, the boys white-robed and singing, the voices of the priests, and the wreath of flowers upon the pall. Some one was taking the last journey that day with befitting solemnity, and it set me thinking of others I had seen pass along the same road.

In Italy I have met funeral processions at night, when the streets were quiet, and the solemn sound of chanting could be heard far off. I have seen the hearse with black nodding plumes, and followed by its train of mourning coaches, blocked up by the crowded traffic of the streets — jostled by cabs and omnibuses — Death flouted by a busy tide of life, which scarce consents to let it pass. In a green lane in Ireland, when the hedges were bursting into leaf and the birds all singing, I came once upon a party of peasants, some score of them waiting by the roadside. There were women wearing cloaks of dark blue cloth, young girls with shawls over their heads, men in the long coats so familiar in Ireland, and so unlike anything one sees elsewhere. From the distance, the sound of voices was heard mingling in a wild musical strain, and by and by the funeral came in sight. The train, already long, was joined by those who had been waiting for it; and so one amongst the people took his last journey away through the lanes to the old burying-ground of his fathers.

Not so striking are village funerals in England. There is nothing picturesque about the poor procession following on foot the cart in which the coffin is placed. No long train of friends and neighbors, no wild strain of music accompanies it upon the road. The few mourners are the immediate relatives of the dead. The neighbors look, perhaps, from their windows as the sad group goes by; but they would not dream of shortening a day's work for the sake of accompanying one amongst their number to the grave. The manner of their starting, too, jarred upon my feelings the first time I chanced to witness it; for, in several instances, they may be seen to leave their lowly houses, not carried solemnly "feet foremost" over the familiar threshold, but pushed abruptly through the window of an upper room.

Dignified enough was the last solemn ride of the old Northern heroes — the body placed upright upon horseback, and so borne into the centre of the mound, whose heaped-up wall of earth was closed over horse and man alike. These mounds may still be seen in Jutland — out on the moors where purple heath and wild thyme grow; and where, on some rare occasions, Fata Morgana, wondrous Cloud Fairy, may be surprised by the lonely wanderer, whose eyes she delights to cheat with her cloud palaces and visionary landscapes. Those who dare disturb the repose of the dead, find strange relics in such mounds; swords, gold ornaments, and drinking horns, curiously carved.

The Indian takes his last journey armed. His bow lies beside him; provisions also are provided for his use until he reach the "happy hunting-grounds." I have seen in foreign cemeteries, a child's favorite toy placed upon its little grave. It makes one think of Luther's letter to his little son Hans, and recall the happy "play-place" which he described Heaven to be. Oh, those innocent children, who play amongst us for a few short years, and then go home to God! May there not be some such innocence in the ignorance of the untaught savage? Are either the hunter's bow or the child's toy quite out of place upon a grave? In Spain, when a baptized infant dies, a feast is spread, and all the neighbors round come, not to condole with, but to congratulate the parents. "We rejoice with you that you have a child in glory," they say; and the last — nay, the *first* journey of the sinless babe is a triumphant march, the funeral a festival, the music glad. Only the mother weeps.

Strange voyage that of a defunct Chinese, absent from his home, whose last wish has been that his body, packed in a square box, should return to the Flowery Land.

In Greece, the last journey follows quickly upon death. The next day, at dawn, the train of white-robed priests and choristers may be seen winding along the road towards the church. There, dressed as in life, and having the face uncovered, the dead lie at rest before the altar until the moment comes when they must be committed to the earth. It is in the church that the last farewell is taken, that the last kisses are given.

On the whole, I am not at all of the old woman's opinion, who declared she "had rather live forever than have a walking funeral." Methinks it would be pleasanter to be borne on the shoulders of men who knew us when alive, and who would carry us tenderly along the familiar way to our quiet rest in the churchyard, than to drive there in a gloomy hearse, followed by gloomy mourning coaches. Yet, how little it would matter to us! How little it *does* matter to real mourners!

What of that terrible last journey in the cold North, where the dying Esquimaux is built up in his snow-house, and left to draw his last breath alone? Or of the African tribe, who bury the hopelessly sick before death — hurry them out of the world altogether? They have been described as taking an affectionate leave of their relatives, and performing this burying with the consent of the person chiefly concerned. Habit is everything, and they are used to it; only one fancies it must fall rather hard upon each individual as it comes to his own turn.

But what would the fairest landscape be without its shadows — the gayest music without one minor chord?

Each point we wish to reach upon a journey gives place in turn to others. Nowhere do we linger long. Cities display their treasures of art; bright scenes charm us one after another. We are ever looking back as each future becomes in turn the past. Is it not so in this other journey which all of us are taking? And will it not be always so? Shall we not pass the grave itself upon the road — as we have passed so much else — and look back upon it from out of the new future beyond?

DYNAMITE.

ONE recognizes with something of a feeling of horror that many of the terrible means in vogue for the slaughter of the human race have their origin in investigations undertaken by scientific men with the view of increasing the knowledge, or ameliorating the condition of mankind in general. This is essentially the case with the substance whose name heads this article. Invented originally for the purpose of assisting the peaceful labors of the miner and the engineer, it is now employed as the explosive agent of the torpedoes which defend the rivers and harbors of Germany against the aggressions of the French fleet.

Every one knows what glycerine is, — a clear, syrupy liquid, sweet to the taste, and somewhat greasy to the touch. Its scope of employment ranges from the surgeon's dispensary to the lady's boudoir. Chemists term it a triatomic alcohol, and it may be derived from fat or tallow by the action of lime and sulphuric acid. Its properties are many and various, but as they have no bearing upon the present subject, we shall abstain from noticing them. If a quantity of nitric acid be added to twice its weight of sulphuric acid, and glycerine be poured into this, and carefully stirred — the whole being surrounded by a freezing mixture — we obtain that wonderful substance known as nitro-glycerine, which has more than ten times the explosive force of gunpowder. It forms on the surface as an oily-looking liquid of a pale yellow color, is perfectly inodorous, and has a sweet, aromatic taste. It is poisonous, whether taken internally or absorbed through the skin, and small doses of it produce distressing headaches. Although practically insoluble in water, it dissolves readily in ether, alcohol, or wood-spirit.

Nitro-glycerine was discovered in the year 1847, by an Italian, named Ascogne Sobero; but its practical application is entirely due to the researches of Alfred Nobel, a Swedish mining-engineer. It does not explode when brought into contact with fire, and remains unchanged even when raised to the temperature of boiling water; but at about forty degrees Fahrenheit, it becomes converted into an icy mass, which merely requires friction to develop all its explosive qualities. This peculiarity has been the cause of many lamentable accidents, when M. Nobel commenced a series of experiments with the view of rendering its employment comparatively safe. After some time, he found that mixing it with about ten per cent. of wood-spirit rendered it practically harmless, and this method is now generally adopted. When required for use, the wood-spirit can be removed, and all the properties of the nitro-glycerine restored by the simple addition of water, which, mixing with the spirit, sets free, as it were, the nitro-glycerine. The only drawback to this plan is, that when the nitro-glycerine is reconverted into its original state, it is of course quite as dangerous as ever.

To obviate this, M. Noble has invented a new mixture, which he terms "dynamite." It consists of seventy-five per cent. of nitro-glycerine, and twenty-five per cent. of very fine sand, and is a brownish-looking powder, something like sawdust, only greasy to the touch. It burns without explosion when placed in a fire, or brought into contact with

a lighted match. If struck with a hammer, on an anvil, the portion struck takes fire without inflaming the dynamite around it. As a proof of the perfect security with which it may be handled, we may mention that M. Nobel has placed a case containing about eight pounds of it (equal to nearly eighty pounds of ordinary powder) on a brisk fire, and that the dynamite was consumed without noise or shock; while a similar case was flung from a height of sixty-five feet on to a hard rock without producing the slightest explosion. A weight of over two hundred pounds was then let fall from a height of twenty feet upon a box of dynamite; the box was smashed, but again there was no explosion.

The usual method of firing dynamite is by means of a copper capsule containing fulminate of silver,—the latter being inflamed either by the ordinary slow-match, or by the electric spark. The employment of this capsule and detonating composition is absolutely essential for the explosion of dynamite. In order to give some idea of the force developed by such an explosion, it may be mentioned that a spoonful of it placed upon a block of quartz, covered with bricks, and fired, caused the quartz to be broken up into pieces about the size of a pea, and reduced the bricks to powder. Like nitro-glycerine, dynamite congeals at a comparatively high temperature; but to restore it to its proper condition, it is only necessary to put it in a warm place, or, if it is contained in closed cartridges, to plunge it into warm water.

In mining operations, dynamite possesses many advantages over nitro-glycerine, besides those already mentioned. It has been usual, for instance, to pour the nitro-glycerine in a liquid state into the holes bored in the rock for its reception; and running from these into some unknown crevice, it has frequently, when fired, produced an explosion under the very feet of the miners, causing, of course, a disastrous loss of life. To obviate this, it has been necessary to employ cartridges which do not completely fill up the bore-holes, so that a portion of the explosive force is wasted. Dynamite, on the other hand, being of a pasty consistence, yields to the least pressure, and completely fills up the holes, so that a given weight of this substance is almost as effective as a given weight of nitro-glycerine, while at the same time it is safer even than gunpowder.

It remains to be seen whether the anticipated advantages will be derived from its employment as a munition of war.

THE BAROMETER, OR WEATHER-GLASS.

NEXT to the question, "What is the time?" is the morning household inquiry as to "What will the weather be?" A barometer, as well as a clock or watch, is usually to be found in every house, but the reason for its weather-indicating oscillations is too frequently passed over as practically unimportant, or regarded as "one of those things which no fellow can comprehend." The instrument itself is exceedingly simple in construction, and the principle upon which it acts is readily explained.

To arrive at simple but correct data for determining the present or forthcoming state of the weather, the following instruments are indispensable, viz.: a barometer, a thermometer, and an hydrometer, in connection with the observed direction of a weathercock.

The Barometer.—For two thousand years the phenomena on which the action of the weather-glass is dependent (now referred to the pressure of the air) were explained by the dogma of the ancient philosophers — that "*Nature abhors a vacuum.*" It was noticed that space was always filled with some material substance, and that the moment a solid body was removed, air or water always rushed in to fill the space thus deserted. Hence it was concluded that it was a universal law

of Nature that space could not exist unoccupied by matter, and the above phrase was a figurative expression of this idea.

Thus, when the piston of a common pump was drawn up, the consequent rise of the water was explained by declaring that, as according to the nature of things a vacuum could not exist, the water of necessity rushed into the space the piston had previously occupied. In the middle of the seventeenth century philosophers discovered a limit to Nature's abhorrence of a vacuum. Some Florentine engineers, employed in sinking a pump to an unusual depth, found they could not raise water in the tube higher than ten metres, or thirty-two feet. So remarkable appeared this limit to their skill, that they consulted the great philosopher Galileo; but though he had taught that air has weight, he failed to perceive the proper explanation why the water could not be raised higher than thirty-two feet, and is said to have replied, that "Nature did *not* abhor a vacuum *above ten metres.*"

This engineering failure led to a most important physical discovery. Torricelli, a pupil of Galileo, pursued the inquiry, and reasoned that the force, whatever it might be, which would sustain a column of water ten metres high, in a cylindrical tube, must be equivalent to the weight of the mass of water sustained; consequently, if another liquid, heavier than water, were employed, the same force could only sustain a column of proportionally less height.

The liquid metal, mercury, being 13½ times heavier than water, Torricelli argued that the force that sustained a column of water ten metres high could only sustain a column of mercury 13½ times lower, or about 76 centimetres high. To prove this, he made the following experiment, one which has ever remained memorable in the history of science. Torricelli took a glass tube, about 32 inches long, open at one end and closed at the other; this he filled with pure mercury — having closed the open end with his thumb — and inverting the tube, plunged the open end into a basin of mercury. On removing his thumb, the mercury, instead of remaining in the tube, fell, as he expected, and after a few oscillations came to rest at a height of about 76 centimetres, or 30 inches above the level of the mercury, in the basin.

The correctness of his argument being thus verified, he further reasoned, that the weight of a column of air of the height of our atmosphere was just sufficient to counterbalance or support a column of water about 32 feet in height, or a column of mercury about 30 inches in height.

This experiment, and the resulting doctrine, caused a great sensation among European *savants*, and (as is usually the case when teachers have to be sent to school again to unlearn what they have taught) opposition. The celebrated Blaise Pascal, however, recognized the force of Torricelli's reasoning, and devised a crucial experiment. "If (said he) it be really the weight of the atmosphere, under which we live, that supports the column of mercury in Torricelli's tube, we shall find — by transporting this tube upwards in the atmosphere—that in proportion as it leaves below it more and more of the air, and has consequently less and less above it, there will be a less column sustained in the tube; inasmuch as the weight of the air above the tube, which is declared by Torricelli to be the force which sustains it, will be diminished by the increased elevation of the tube." This argument Pascal verified by first sending Torricelli's tube to the top of a church steeple, and afterwards to the top of the high mountain of Puy de Dôme. In the first instance, he found only a slight fall in the height of the mercury, but in the second, the difference between the height of the column on the plain and on the mountain-top amounted to nearly eight centimetres, or three inches. This experiment put an end to further controversy on the subject, and the dogma of Nature's abhorrence of a vacuum had to give place to an established philosophical principle.

If we repeat Torricelli's experiment,

we shall notice that, on the mercury (which completely fills the tube) coming to rest, a vacant space is left in the upper part of the tube. This is a vacuum, the most perfect one it is possible to attain, and which is known under the term of the "Torricelli vacuum." If we bring a Torricelli tube under the influence of an exhausting syringe, on working the pump we shall find that with each upward stroke of the piston, as the pressure on the surface of the mercury in the cistern decreases, there is a corresponding fall in the column of mercury, and rise in the level of the mercury in the basin, as the rarefied air can no longer support 30 inches of that metal. If, on the other hand, we bring a Torricelli tube under the influence of a condensing syringe, on increasing the external pressure on the surface of the mercury in the cistern, the column of mercury rises, and the mercury in the basin falls.

As a column of mercury 30 inches high, and 1 inch superficial in section, has experimentally been proved to weigh, as nearly as possible, 15 lbs., and as such a column is, as nearly as possible, that which the pressure of a column of air will support — it results that the weight of a column of air of the height of our atmosphere, and of surface equal to 1 inch superficial, will also equal, as nearly as possible, 15 lbs.

But our atmosphere, besides being a heavy, is also an elastic fluid — therefore compressible — so the lower strata is condensed by the weight of its superincumbent mass. The density of our atmosphere, therefore, cannot be uniform, but must diminish and become rarer as we approach its upper limits; and this we can readily prove to be the case by taking a flask, closed air-tight at the foot of a mountain, to the summit; on opening it, air will rush out of the vessel. On again closing it air-tight, removing it to the base of the mountain, and reopening it, air will rush in.

We have thus far learnt that the mercury is sustained in Torricelli's tube by the pressure of the air on the surface of the mercury in the cistern, and that that pressure on a given surface of mercury is proportional to the height of the column.

The experimental tube of Torricelli is, in fact, the instrument now universally known as the barometer, its name being derived from two Greek words, signifying *weight-measurer*, though it is used as a measure of atmospheric pressure in the same manner as we use a weight as a measure of mass, or an arc as a measure of angle.

Experience teaches that the height of the column of mercury varies when kept at the same level in the same place. Such variations indicate corresponding changes in the density and elasticity of the surrounding air; when the air's density and elasticity are increased, the mercury rises; when they are diminished, it falls. The column, therefore, measures the intensity of the atmospheric pressure, and it is only necessary to add a recognized scale, to accurately measure the *height of the barometer* and the variations in the instrument. In Germany, the old Paris standard is generally adopted; in France, the decimal scale; and in England, the English yard-measure is employed for the barometric scale.

It is commonly supposed that a steady rise in the barometer indicates the approach of fine, and a steady fall that of rainy weather; a sudden and great fall the approach of a storm, and a sudden rise the clearing up of a storm; hence this instrument has popularly obtained the name of "the weather-glass." The common barometers are marked "Fair," "Change," "Rainy," etc., against certain points of the scale; but the sooner these terms are disused, by public consent, the better, as they have no foundation on fact, and are useless and misleading. Though in general terms we may say that the rise and fall of the mercury indicates a change of weather, in reality the mere observation of either of these effects, taken alone, is not a sufficient guide. High winds, electrical tension, and other causes not yet thoroughly understood, exert their specific influences on the pressure of the atmosphere, either to densify or

rarefy it. In England, and in this country, 30 inches is taken as the mean or standard measure for the pressure of the atmosphere, and the variation ranges between 28 inches and 31 inches. Other causes that influence the height of the mercury are: 1. The effect of temperature upon this metal, which, like others, expands with heat and contracts with cold, so that on a hot day (other things being equal) the reading would be higher than on a cold day. 2. When the mercury is rising, its surface is slightly convex; when falling, concave, which may lead to a trifling source of error in taking the readings on the scale. 3. Should the tube of the barometer be small, the capillary attraction between the glass and the liquid metal would exert an action sufficiently great to create an error. When great correctness of observation is desired, corrections for temperature and capillary action must be made, for which purpose tables of corrections have been drawn up by meteorologists.

Should the smallest quantity of air creep into and up the barometer tube, it would create a serious deterioration to the efficiency of the instrument, for were but 1-1000th inch of air let into the bottom of the tube, on reaching the top or Torricellean vacuum, it would expand to 1 inch.

From these statements it will be obvious that great care is required in the manufacture of the barometer, and the following are the points of construction: A clean glass tube, over 33 inches long, of a diameter that will render the column of mercury distinctly visible, and reduce the capillary action to a minimum; mercury chemically pure, and freed from air by boiling; an arrangement for preventing air-bubbles passing up the tube; an accurately graduated scale, with some provision for correctly expressing the real height of the column from the level of the metal in the cistern. Besides its use as an indicator of present or coming weather, the barometer is employed for determining the height of mountains and other elevations above the level of the sea, and is of the greatest value to the experimentalist in determining certain physical properties of gases, vapors, etc.

LESSONS FROM CHINA.

HEAR what an intelligent man, a native of one of the most careful nations on earth in material matters, says of the Chinese, that agglomeration of 500 millions, which we, in our pride, regard as half civilized. M. Simon, consul of France in China, gave the Acclimatization Society of Paris a sketch of his observations and experiences in the latter country, and recounted some traits of character of much interest. China possesses no meadow land except in the extreme north, and Mongolia abounds in cattle, but it is not easy to bring them eight or nine hundred leagues to feed the south; so that the Chinese have to look elsewhere for their supplies. Fresh water fish, of which we take so little account, forms one great element of food; the Chinese have for centuries made the breeding and preservation of fish an occupation of the highest importance; the rivers, rivulets, lakes and canals, which abound in two-thirds of the country, swarm with fish, and it is almost impossible to form a notion of the fecundity which ages of care have brought about; fishing is going on everywhere, not only in streams, lakes, and canals of all dimensions, but in the ditches of the rice fields, and even in pools of rain-water; indeed, there are some kinds of fish that multiply so rapidly that they spawn twice a month. The Chinese use nets of all kinds, and ground lines, and also employ the cormorant to aid in the taking of fish; it forms the every-day food of at least 350 millions of the inhabitants, and the supply never fails; a self-evident fact, when we know that ordinary fish costs only about 2 cents per lb. in China, and that the most delicate kind

is only worth from 10 cents to 12 cents. But if fish is the common, it is not the only animal food of this people; for the pig, the duck, and the fowl are also grand resources. Pork has become such an important article of food, that it is dearer than beef, although the latter is scarcer; as to ducks, they may be seen by flocks of many thousands on the waters, where they are preserved with much care. Children seated in little canoes guard them, but the drakes lead them to and from the water, watch them from the shore, and recall them with a peculiar cry, which the young ducklings seem perfectly to understand. Ducks form an important article of trade, and when dried and pressed between two boards like plants in an herbarium, they are sent all over the empire. Dogs of a peculiar breed, and even rats, are prepared in the same way for the poorer classes. Sheep and goats come next to the pig, duck, and fowl in importance; as to game, it is so plentiful, by preservation, no doubt, that a small cart-load is not worth more than about $1.25 in the capital.

The basis of Chinese food is, however, vegetable; and when we remember that from four hundred to five hundred millions of Chinese live in a country not more than four or five times larger than France, which has not a tenth part of the population, it is easy to form an idea of the pitch to which cultivation has been carried. There are from seventy to eighty kinds of vegetable substances grown in China, twenty-five of which at least are produced as food. Rice is the most important of all, and the pains that are taken in its cultivation are extraordinary; in order to supply the rice-grounds with water, enormous mountains have been pierced, immense lakes excavated, the waters of rivers and small streams are carefully retained, and turned into small canals and ditches, which surround and intersect the fields in every direction. M. Simon says, that he believes the world never saw a greater or more admirable work than that vast system of irrigation which, from the West of China to the sea, places all the water under the hands of the farmer and gardener. Not only rice, but every kind of crop is cultivated with the utmost pains. The result is magnificent; the yield of rice is nearly five tons per acre, and that of other crops in proportion. Labor alone, even with the most complete irrigation, would not yield such a result; the secret is in the application of manure; every atom of refuse is returned to the land in China, and, where the supply is small, it is made up from the sea. Without any great science, the Chinese have established a complete system of manuring in which nothing is lost, and fœcal matter of all kinds, decayed vegetables, bones, lime, oyster-shells, fish, and sea-weed, are used up. They have a dozen recognized methods of preparing manure according to the soil, the crop, and other circumstances; they are not very fastidious, and the smells in the villages and towns are not agreeable; but the grand problem is solved, of employing the entire refuse of hundreds of millions of people — with immense labor, it is true, but with great profit also — in the production of food. So complete is the system, that the manure is carried in barges and in pails slung on bamboos wherever it is wanted, often to great distances.

In the use of fuel the Chinese show the same economy; with a few pounds of dry vegetable matter, which does not cost a cent per pound, they will cook a meal for a whole family.

We boast of our science, our industry, our wealth; but how long will it take us to arrive at a state of economy which has existed throughout the Chinese Empire during so many centuries?

How to Keep Away Flies.—In Belgium, according to the Food Journal, the butchers use laurel oil on the door-posts and window-frames, for the purpose of keeping away flies, with great success. So simple a contrivance would be a great boon to the habitués of eating-houses and confectioners, and would be useful to every housekeeper. The emanation from minced laurel leaves is rapidly fatal to all small insects.

"Old Clo', Old Clo'."—To suggest to a splendidly-attired young lady that we think we recognize her aerial dress as having been worn last week by Mrs. A——, or to ask if her delicate satin slippers had not formerly belonged to Miss B——? would be thought to be the height of insult and impertinence. But if this be so, how comes it, we venture to ask, that there should be a portion of the adornment of every fashionable lady just now, which is something a little worse than a second-hand gown or shoes? A cast-off outer garment would be bad enough, an inner one still more disagreeable to think of—but what shall we say to a cast-off or cut-off piece of the other persons themselves? What for nearness of personality compared to a mass of hair? What borrowed shoes could be so disgusting on the feet of a beautiful woman as a borrowed chignon on her head? We wish that the shame which is felt in the one case about the comparatively harmless outside raiment could be transferred to this real abomination, and that every lady should feel that even to be suspected of wearing a chignon made of the hair of some dead or fever-stricken woman, or woman wretched enough to be willing to sell her natural crown, was as much of an insult as to be taxed with wearing a cast-off skirt or a mantle out of an old clothes' shop.

The Nose.—The nose acts like a custom-house officer to the system. It is highly sensitive to the odor of the most poisonous substances. It readily detects hemlock, henbane, monk's-hood, and the plants containing prussic acid; it recognizes the fetid smells of drains, and warns us not to smell the polluted air. The nose is so sensitive that it distinguishes air containing the 200,000th part of a grain of the otto of rose, or the 15,000,000th part of a grain of musk. It tells us in the morning that our bedrooms are impure, and catches the fragrance of the morning air, and conveys to us the invitation of the flowers to go forth into the fields and inhale their sweet breath. To be led by the nose has hitherto been used as a phrase of reproach; but to have a good nose, and to follow its guidance, is one of the safest and shortest ways to the enjoyment of health.

Cause of Thunder.—A new theory of the cause of thunder is broached in the *Scientific American*. It is that the water is decomposed by lightning and the gases instantaneously reunite, causing an explosion.

A friend once visiting an unworldly philosopher, whose mind was his kingdom, expressed surprise at the smallness of his apartment. "Why, you have not room," he said, "to swing a cat!" "My friend," was the serene, unappreciative reply, "I do not want to swing a cat."

The easiest and best way to expand the chest is to have a good, large heart in it. It saves the cost of gymnastics.

EDUCATIONAL PRINCIPLES.

WORDS, instead of ideas, are worshipped. The teaching of science, if properly done, is the reverse of this, and will go far to remedy its defects. Books in this case ought only to be accessories, not principals. The pupil must be brought in face of the facts through experiment and demonstration. He should pull the plant to pieces and see how it is constructed. He must vex the electric cylinder till it yields him its sparks. He must apply with his own hand the magnet to the needle. He must see water broken up into its constituent parts, and witness the violence with which its elements unite. Unless he is brought into actual contact with the facts, and taught to observe and bring them into relation with the science evolved from them, it were better that instruction in science should be left alone. For one of the first lessons he must learn from science is not to trust in authority, but to demand proof for each asseveration. All this is true education, for it draws out faculties of observation, connects observed facts with the conceptions deduced from them in the course of ages, gives discipline and courage to thought, and teaches a knowledge of scientific method which will serve a lifetime. Nor can such education be begun too early. The whole yearnings of a child are for the natural phenomena around, until they are smothered by the ignorance of the parent or teacher. He is a young Linnæus roaming over the fields in search of flowers. He is a young conchologist, or mineralogist, gathering shells or pebbles on the seashore. He is an ornithologist, and goes bird-nesting — an ichthyologist, and catches fish. Glorious education in nature, all this, if the teacher knew how to direct and utilize it. But as soon as the child comes into the school-room, all natural God-born instincts are crushed out of him; he is to be trained out of all natural sympathies and affections, pruned, trimmed and cramped, and the young intellect bound, as gardeners in olden times bound trees and shrubs, till they assumed monstrous and grotesque forms, altogether different from the wide-spreading foliage and clustering buds which God himself gave to them, and which man is idiot enough to think he can improve. Do not suppose that we wish the primary school to be a lecture theatre for all or any of the "ologies." All the science which would be necessary to give a boy a taste of the principles involved in his calling, and an incitement to pursue them in his future life, might be given in illustration of other subjects. Instead of mere descriptive geography drearily taught and drearily learned, you might make it illustrative of history, and illustrated by physical geography, which, in the hands of a real master, might be made to embrace most of what is desirable to teach. The properties of air and water, illustrations of natural history, varieties of the human race, the properties of the atmosphere as a whole — its life-giving virtues when pure, and its death dealings when fouled by man's impurities — the natural products of different climes, these and such-like teachings are what could be introduced with telling and useful effect. Far better this than overlading geography with dry details of sources and mouths of rivers, of isothermal lines, latitudes and longitudes, tracks of ocean currents, and other tendencies towards the old verbalism and memory-cramming. The precious hours should be regarded as the training for a whole lifetime, and should be used only for the purpose of giving living and intelligent learning, not obsolete and parrot instruction.

—*From an article by Dr. Lyon Playfair.*

BABIES. — Babies are such imitative animals, and cling so tenaciously to what they early learn, that fond mothers should be careful to address them in sound grammatical English. The nonsensical talk indulged in by devoted parents is said to induce great backwardness in the acquisition of language by the babe.

ON VOLCANOES.

IF the question be asked, what is a volcano? the simplest reply would be "a hole in the ground deep enough to reach such portions of the interior of the earth as are in a molten condition."

In ordinary language, however, the appellation of volcano is usually restricted to those cone-shaped mountains, from the hollow summit of which, flames, smoke, and vapors are at times seen to ascend, and which occasionally break out into more imposing activity, by vomiting forth showers of ashes and fragments of incandescent rock, or by pouring out torrents of molten stone, to deluge and devastate the unfortunate country in the vicinity.

It having always been admitted that volcanoes owed their origin to forces operating from below, it was suggested by Von Buch, and supported by Humboldt and others, that volcanic cones must be formed by some portion of the surface of the earth, weaker than the rest, being forced out, or, as it were, thrown up like a soap-bubble, by the pressure of the vapor and gases confined below, the strata being thereby elevated, fractured, and tilted up on all sides, so as to produce a conical elevation, the central fissure in which became a crater or vent, for the escape and passage of the gaseous and liquid emanations from below.

This hypothesis, which accounted for the formation of volcanic cones and craters by a process of upheaval, or, as it was termed, the "crater of elevation," is here alluded to, only because it for a long time was accepted by many eminent men of science, until the subsequent researches, especially of Mr. Scrope and Sir Charles Lyell, demonstrated conclusively that it is not confirmed when their actual structure is studied in the field, and explained their true formation, by what is now termed the "crater of eruption" theory.

If we imagine a volcanic cone cut through its centre, so as to present us with a section of its entire mass, it will be seen that the mineral matter of which it is composed possesses in itself a sort of arrangement in layers, which, at first sight, somewhat resembles beds of ordinary sedimentary origin, broken through and tilted up towards the centre; a closer examination, however, shows that these layers were never at any time horizontal, but that, on the contrary, they had from the very first been deposited in the same inclined position in which they are now seen, and that they must have been formed subsequently, not previous to the opening of the crater itself, since they are entirely composed of matter thrown up from its orifice.

The commencement of an eruption is known in most cases by certain preliminary symptoms, indicative of great internal disturbance, such as rumbling noises, and sounds as if of explosions below, which have been likened to subterranean thunder. The surface waters, springs and wells in the vicinity, generally acquire an unusually high temperature, diminish in volume, or disappear altogether, and repeated earthquake shocks, more or less severe, are felt, which eventually culminate in a grand convulsion, by which the surface is rent asunder with fearful violence, allowing immense volumes of previously pent up vapor and gases to rush forth from the fissure with such impetuosity as to hurl high into the air huge fragments of the shattered rocks, along with vast quantities of molten lava, in so liquid a condition that during its ascent it is seen to be splashed about in the air like water, and to become separated into particles of all sizes. Vast quantities of these particles, to which the name of volcanic ash or dust has been applied, are instantaneously reduced to so fine a state of division, literally "blown to atoms," as to become converted into an almost impalpable powder, capable of being carried away by the winds prevailing during an eruption, to distances of even hundreds of miles from the orifice from which they had been ejected, and ultimately settle down on the land or in the sea, to form deposits, whose nature would often be a puzzle to geologists, did not the microscope at once reveal their true mineral character and volcanic origin. Other particles, less finely divided, become granulated, and fall down from the air in the shape of small black grains, known as volcanic sand; whilst still larger portions, owing to the bubbles of vapor or gas entangled in their substance, descend as black porous or spongy stones, from the size of a pea to that of one's head, or larger; and have received the names of Lapilli, scoriæ, or volcanic cinders, from their presenting much the appearance of an ordinary cinder from a coal fire. Although the scoriæ thrown up by volcanoes are in major part of a dark color, there are also others (called trachytic), much lighter both in color and weight, which are usually more common at the commencement of an eruption; the ordinary pumice stone, which is imported in large quantities from the volcanoes in the Lipari Islands, for the use of the painters, etc., is an example of this variety, familiar to you all.

The formation of a new, or reopening of an old volcanic vent, is usually accompanied by a terrific explosion, often to be heard at immense distances; thus, in 1812, the outburst of the volcano of San Vincent was heard in the north of South America, some 700 miles distant. The enormous force developed by the rush of gases and

vapors from the fissure, may be imagined when it is known that in the eruption of Mount Ararat, in 1840, huge masses of rock, weighing as much as twenty-five tons, were thrown out of the crater; Cotopaxi is said to have even hurled a 200-ton rock to a distance of nine miles; whilst the volcano of Antuco, in Chili, in 1828, sent stones flying to a distance of thirty-six miles.

When an eruption is at its height, the spasmodic puffs or blasts are jerked out at intervals of but a few seconds, attended by a terrific roaring or bellowing noise, difficult to describe in words.

The buried cities of Stabia, Herculaneum, and Pompeii, covered up, in parts, to the depth of 100 feet, by the ashes of Vesuvius, are ocular proofs of the vast quantity which can be sent out of a volcanic vent during an eruption. The volcano of Sangay, in Ecuador, in constant activity since 1728, has buried the country around it to a depth of 400 feet under its ashes, and a French geologist has estimated that in the course of only two days the volcano of Bourbon has thrown out no less than 300,000 tons of volcanic ashes. The immense distances to which these may be transported by the winds is no less surprising; the ashes of Vesuvius, in the eruption which buried Pompeii, darkened the sun at Rome, and were carried as far as Syria and Egypt; those from San Vincent, in 1812, are reported to have made the sky as dark as night in the Barbadoes; and in Iceland, in 1766, the air became so charged with ashes for a distance of 150 miles around Hecla, that even the brightest light could not be distinguished at a few yards.

Amongst the still active volcanoes we meet with some whose craters are several miles in diameter, encircled by precipitous sides, rising to even a thousand feet above the bottom of the crater when at rest, which, as in the Sandwich Islands, may contain reservoirs, or rather lakes of liquid lava, two to four miles across, and at times send forth rivers of molten stone, several miles in breadth, extending their fiery inundation to a distance of even forty miles from the crater whence they issued. In the eruption of Hualalai, in 1801, a lava current, after reaching the coast, poured out such volumes of melted matter as to fill up a bay some twenty miles deep, and in its place extend a headland some three or four miles farther into the sea. The rate at which these rivers of molten stone flow, is a very varying one; in 1805, the lava current from Vesuvius is said to have run down the first three miles in four minutes, yet only completed its total distance, of six miles, in three hours; and in 1840, that from Mauna Loa, advanced no less than eighteen miles in two hours; whilst, on the other hand, it is recorded that during the eruption of Etna, which commenced in 1614, and continued many years, the lava stream only completed a distance of six miles in ten years, notwithstanding that all this time it was seen to be in slow but almost imperceptible motion; during the eruption of this volcano in 1865, I found, however, that at the edge of the current the rate of motion varied from 15 to 120 feet per hour, according to local circumstances; in the centre of the stream, the lava was evidently still more rapid in its movements.

When, owing to the descriptions of the ground around volcanoes, the water from springs, rivers, lakes, or the sea itself, is brought into contact with the heated mineral matter below, we have the production of the so-called mud volcanoes, or of fissures sending forth torrents of heated mud and water, and often, to the great surprise of the inhabitants, throwing out numbers of fishes, which had lived previously in these sources. The Geysers of Iceland are somewhat similar phenomena, but on the present occasion, time will not permit these subjects being treated in detail.

It must not be supposed that the depths of the sea are exempt from such visitations, and in the last few years we have had several prominent examples to the contrary, in different parts of the world. Submarine volcanoes were well-known to the ancients; Pliny and older writers refer to those in the Mediterranean, which threw up the islands of Delos, Rhodes, Anappe, Nea, etc. In the Cyclades, very curious examples have occurred, both in very ancient and in the most recent times. Of these islands, Therasia is recorded to have been formed in the third century B. C., as also somewhat later in the same century the island of Thera, now called Santorin; subsequently Hiera, 91 B. C., and then Thea, A. D. 19, appeared, which last two were, in 726, united by an eruption, and together formed the present island of Kaimeni. In 1575 a smaller island called Little Kaimeni, showed itself, around which, in 1650, numerous other islets were thrown up, which subsequently became united to Little Kaimeni, during the eruptions, which continued from 1707 to 1812, when the island, thus increased in size, became known as New Kaimeni. Finally, the last eruption (still going on), which commenced 28th January, 1866, presented us, on the 2d February, with a new island, now called King George's Island, from the present King of Greece, which, according to the latest accounts, still continues to increase in size. Numerous other examples might be cited, but I shall only mention the island of Johanna Bogoslawa, in Alaska, which, although it only first showed itself above the water, in May, 1796, had, in 1806, increased so as to be an immense volcanic island, the summit of which was then ele-

vated to no less than 3,000 feet above the level of the sea.

The volcanic products thus forced out under the sea, present, as might be expected, a very different aspect from that of the ashes, scoria, and lava from terrestrial volcanoes; the molten lava coming in contact with the water is at once broken up into fragments, coarser or finer, in proportion to the greater or less cooling power of the water in immediate contact with them, and often, in great part, instantly converted into fine mud, of a grayish color when formed from prachytic lava, but more commonly of a chocolate or other dark tint, and much denser when produced from the more prevalent pyroxenic lava. Beds of this character, spread out by the action of the sea, often enclosing shells, fish, and other organic remains, become, in time, consolidated and upheaved, and as they often present an appearance much resembling ordinary volcanic rocks, they have frequently puzzled geologists, who at first found a difficulty in explaining the presence of such fossils in rocks apparently of igneous origin.

Volcanic rocks may be classified under two heads, viz., the dark-colored, more dense; and the less heavy, light-colored lavas, termed, respectively, the basic or pyroxenic, and the acid or trachytic lavas. Both these varieties may proceed from the same volcanic vent in succession, — for instance, in Vesuvius, where the mineral matter which buried Pompeii, is trachytic, but the later lavas are generally pyroxenic in character. This also was the case in the recent eruption of Santorin, as reported upon by the Austrian Scientific Commission.

The examination of volcanic products, no matter how distant the volcanoes may be from one another from which they are taken, prove them to be altogether identical in general, mineral, and chemical constitution.

Taking these and other data into due consideration, I cannot arrive at any other conclusion than that all volcanoes are connected with one another in depth, and having one common source, not necessarily situated at any enormous depth below the surface, but in which the molten matter — whilst always containing certain general characters — has undergone considerable modifications in composition, mineralogical and chemical, from time to time in the world's history; for under the term volcanic rocks, I would here include all eruptive rocks, without exception, whether called granites, syenites, porphyrites, basalts, or lavas, all of which I regard as but so many members of one series, or simply as the products of the volcanic action of different geological epochs.

Now if it be true that we have a vast accumulation of molten matter at a certain depth below the surface, which observation further informs us, must, in major part, consist of the silicates and sulphides of the metallic elements, then, in my opinion, at least, it only requires the assumption that water from the sea should, by some means or other, find its way down into such a reservoir, to account for all the phenomena of volcanoes, both mechanical as well as chemical. The greater part of the water so introduced would be at once converted into steam, which, in its turn, would become still further expanded by a heat so great as that of molten lava, and would develop an enormous power. Calculations have been made which show that water, even when treated to a much less temperature, would exert an "ejection force," as it has been termed, even exceeding that developed in eruptions of the highest volcanoes known. Another portion of the water with the air carried down along with it, acting upon the highly heated sulphides, would become decomposed, and furnish the sulphuretted hydrogen, sulphurous acid, and nitrogen gases given off, whilst the common salt in the sea water, by its action on the hot silicates in presence of steam, would eliminate hydrochloric acid, and account for the appearances of it, as well as of the volatile chlorides found in volcanic fumes. If we accept this explanation, the chemical reactions would be but the effects and not the cause of volcanic phenomena.

The destructive effects attendant on volcanic convulsions are of two different characters, viz., those arising from the earthquakes which accompany, and, as a rule, precede outbreaks; and those caused by the products ejected from the volcano itself. The connection of earthquakes with volcanoes has been noted from the oldest times; the earthquakes which commenced A. D. 63, were but the efforts made by Vesuvius to relieve itself, which culminated in the great eruption of 79; the same was the case in Mexico, with Jorillo, in 1759, and with the great earthquake of 1834, in Chili, which ended in the outbreaks of Osorno and three other volcanoes of the Andes; and lastly, in 1868, the terrible earthquake which visited the coast of Peru, and totally destroyed the cities of Arica and Iquique, was followed by the eruption of Isluga, which, according to the latest news, still continues. There seems little reason to doubt that all earthquakes are of purely volcanic origin, and that volcanoes themselves may be regarded as so many safety-valves, for blowing off the surplus steam, gases, and molten products, from our great internal boiler; for, as a rule, it has been observed that earthquakes either cease altogether or diminish greatly in violence as soon as a neighboring volcano has cleared its throat.

The study of volcanic phenomena presents a wide and interesting field for explo-

ration, for, as yet, our knowledge of the subject is lamentably defective. To follow it up, however, the student should work out a path for himself, taking advantage of every new means of research placed in his hands by the advance made by the collateral sciences, and steering clear of all schools or preconceived notions. Schools in science are what parties are in politics; the "follow my leader" style will not do in this age, for it does not permit of that perfect independence of thought, absolutely requisite to insure success in the pursuit of science.

From an article in "Nature," by D. Forbes.

MY ETHER DREAM.

Oh! what a boon is Ether-Dream—
When you *dream all pain* away! [while,
While you *breathe*! and smile! you are pleased the
Tho' dreary and *dark* the *day!*
Tho' the *heart* be sad, tho' the brain be *mad*,
There's a bright, there's a beautiful dream.

SUSAN GLENWOOD.

TABLE CONVERSATION. — A great deal of character is imparted and received at the table. Parents too often forget this; and, therefore, instead of swallowing your food in sullen silence, instead of brooding over your business, instead of severely talking about others, let the conversation at the table be genial, kind, social, and cheering. Don't bring disagreeable things to the table in your conversation, any more than you would in your dishes. For this reason, too, the more good company you have at your table, the better for your children. Every conversation with company at your table is an educator of the family Hence the intelligence, and the refinement, and the appropriate behavior of a family which is given to hospitality. Never feel that intelligent visitors can be anything but a blessing to you and yours. How few have fully gotten hold of the fact, that company and conversation at the table are no small part of education!

WOMEN'S DRESS. — No amount of money to buy clothes, and no skill in the artist who makes them, can compensate for a want of taste in the wearer. Taste in dress commonly indicates a general sense of the becoming in all domestic concerns. The Frenchman who wrote a treatise, "The Duty of a Pretty Woman to Look Pretty," did not address himself to the discussion of a mere frivolity. There was an undercurrent of philosophy beneath it.

THE SICK. — There are in the United States 1,360,000 constantly sick, or twenty-four to each physician. In the U. S. Army one medical officer is provided to three hundred and thirty-three men in regiments.

A CELEBRATED professor, thinking to perplex an unfortunate pupil, one day put him the following question: — "Pray, sir, can you tell me how long a man may live without brains?" To which the pupil, looking up in the face of the interrogator, promptly but unexpectedly replied, "How old may you be yourself, professor?"

A PAPER has this advertisement:—"Two sisters *want washing*." We fear that millions of brothers are in the same predicament.

A MODEL surgical operation.—To take the cheek out of a young man, and the jaw out of a woman.

AN old maid, speaking of marriage, says it's like any other disease — while there's life there's hope.

MOONLIGHT SCENERY.

WRITTEN AFTER A LONG WALK.

I.

O GLORIOUS orb of beauty, love, and light,
Brightest of gems that crown the brow of night;
Walking the sky in queenly majesty,
'Midst cloudy train, and starry melody!
Again we see thee circling on thy way;
And these thy fair attendants, all around
In stars and galaxies and systems, ray
Their liquid glory, and, with choral sound,
Light from their vaulted steep the hyaline profound.

How wondrous fair is the illumined scene
Of earth outspread beneath the silvery sheen!
The misty glory of the lonely hills—
The flashing splendors of the lakes and rills—
The darkling paths, and woods of deep'ning gloom—
The trees with shadows lengthened by the beams—
The chequer'd slopes, and brows of heathy bloom—
The rippling music of the tireless streams—
And rocky torrents glancing in the falling gleams.

II.

O earth and sky! how holy and serene,
The glory poured upon the lovely scene!
For heavenly beauty, love, and silent song
Walk forth abroad, and touch the varied throng
Of grove, and tower, and steep. In days of yore
I've wandered, tranced amid the sacred air,
Through woodland ways, or by the murm'ring shore;
Where often dear companions glad repair,
To blend their mutual love, and hallowed vows declare.

But higher still my contemplations rise,
Whilst I survey the earth and spangled skies;
For, on the hills, and o'er the silver'd mead,
The glory of the great Creator's spread.
'Tis He that clothes these woods, that rolls these streams;
His hand these waving boughs, these uplands own;
And every star that from the azure gleams,
And sun, and firmament, and vaulted zone,
In song and worship circle round th' Eternal Throne.

Boston. REV. CHARLES NAISMITH.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

ON POISONS.

Lead.

LEAD is perhaps the most important of all the metals whose salts are poisonous, because it is one so much used in the arts, in commerce, and in the business of common life. For years past, water has been stored in leaden cisterns, and has been conveyed by leaden pipes. Beer and other portable liquors, from the manner in which they have been made, and from the way in which they have been served out for use, have been brought into contact with lead, and have been the cause of serious mischief, sometimes ending in death. For the decorations of our houses, for the enamelling of jewelry and metal ornaments, for the manufacture of glass, for the glazing of cards, for the storing of tea, snuff, and other articles of food and luxury, which require to be kept from the action of the air, and for other purposes too numerous to mention, lead is held in requisition. So useful a metal is lead, that in treating of its deleterious effects on the human frame, one can hardly recount the injuries it inflicts on us, without showing how far they are outnumbered by the benefits which it confers; and that with but moderate care the former may be almost entirely avoided. As a poison, lead has been rarely used by the murderer or the suicide, for its action is slow, and cases of acute poisoning by salts of this metal are rare. The most serious effects produced by it are those which follow its gradual introduction into the system, by whatever cause this may be brought about. The metal lead is not a poison; but from the readiness with which it is acted upon by moisture in the presence of air, and by acid liquids, it soon forms compounds which are very injurious in small quantities, and which become fatal in their action when, by accumulation, those small quantities become large ones. The appearance which lead presents is so familiar to all, that it is needless to describe it. The metal is so soft that it can be rolled into sheets with comparative ease, or drawn into wire; but it is wanting in tenacity, it will not bear a strain. Unlike most other metals, when lead is expanded by heat, it does not contract, on cooling, to its original size; this is seen in lead roofing, which is exposed to the sun's rays, and in sinks, which are exposed to changes of temperature, from the hot and cold water which is poured into them, for the lead buckles, as it is termed, and folds or creases interrupt its even surface.

The most common ore of lead is the sulphide; it is called galena; and from this the metal is usually extracted by a very interesting process. The sulphide is roasted in a closed furnace, to which air can be admitted. The oxygen of the air removes part of the sulphur from the sulphide, forming sulphurous acid (a gas well known by its unpleasant smell and irritating effects on the mucous membrane), and the lead thus freed from sulphur takes oxygen in its place, and becomes plumbic oxide. Plumbic sulphate is also formed by the oxidation of another portion of the sulphide. When this operation has continued for some time, air is excluded from the furnace, and now the oxygen of the plumbic oxide and of the sulphate acts upon the undecomposed sulphide, taking from it its sulphur, and the sulphur of the sulphate, with its

remaining oxygen, leaves the lead; and thus in both cases the lead remains as metal, whereas the other elements, sulphur and oxygen, escape as sulphurous acid. The silver, which is present in small quantities, is removed by a process called, after its inventor, Pattinson's process, and about 300 ounces of silver are, by it, obtained from a ton of lead. The salts of lead most commonly met with, and which have been known to produce poisonous effects, are: the oxide, or litharge, red lead; the acetate, or sugar of lead; and the carbonate, or white lead; the nitrate, sulphate, and chloride, are also used in the arts. The characters and composition of these salts will be considered with the analysis for lead.

It has been the custom to store water in lead cisterns, and to conduct it through lead pipes; but of late years, other less objectionable materials have come into use for cisterns and for pipes; but where lead is still employed, the pipes are generally coated inside with tin. The use of lead for such purposes is most objectionable, as will be seen from what follows:—If a bright sheet of lead be exposed to the air, it gradually becomes dull or tarnished; the presence of moisture is, however, necessary to produce this effect. The dulness is owing to the formation of oxide on the surface of the lead; and, if the lead be in contact with water, this oxide is dissolved. The carbonic acid of the air, acting on the plumbic oxide, forms a kind of carbonate, which chemists call a basic carbonate—that is, in the same compound with the carbonate there is also a certain quantity of the hydrated oxide, or hydrate of lead. This carbonate is very nearly insoluble, and as it leaves the surface of the lead a new surface is exposed to oxidation, and thus the metal gradually becomes converted into salts of lead, which find their way into the water. These changes take place more largely and with greater rapidity, according as the water is pure or impure. *Pure* water has the most rapid solvent action on lead. The presence of certain salts in water prevent its entering into solution. Calcic hydro-carbonate (the salt of lime which usually exists in spring water) has a marked effect in keeping it free from lead when it is in contact with that metal, for the lead becomes coated with plumbic carbonate, which is insoluble, and so its surface is protected from further corrosion—it seems to act as a coat of paint. Organic matter, whether vegetable or animal, which is found in such large quantities in rivers and ponds, when it is decomposed, gives rise, by the oxidation of its nitrogen, to the formation of nitrates and nitrites. These compounds act upon lead, and cause it to enter into solution. Chlorides also act in a similar manner. Lead may be kept without tarnishing in water that has been boiled, as, by boiling, the air has been excluded, and without oxygen the lead cannot become oxidized. Many cases have occurred of impaired health which have been clearly traced to the water which the sufferers have drank; and who knows but that many of the ailments which trouble us—such, for instance, as impaired digestion—may not be aggravated, or even caused, by taking lead frequently, although in very small quantities; for it must be remembered that it is a substance which accumulates in the system, and only makes its presence known after it has established itself in force so considerable that its attacks are violent and often fatal, and that it can only be removed with difficulty, when detected. It is to be hoped that lead cisterns and pipes will altogether give place to others made of materials which cannot in any way prove injurious.

So long ago as the time of Augustus, it was well known that water in contact with lead was liable to contain salts of that metal; and, as a consequence, the Roman architect, Vitruvius, prohibited its use in the construction of pipes for conducting water. Galen discountenanced lead vessels for storing water, as well as lead pipes. He knew the properties of the metal, and that water containing lead affected the persons who drank it with dysentery. A family in the town of Worcester, England, was subject to constant attacks in the stomach and bowels; eight of the chil-

dren and both the parents died in consequence. The house being sold after their death, the purchaser found it necessary to repair the pump, because the cylinder and cistern were riddled with holes as thin as a sieve. The plumber who renewed it informed Dr. Wall, who relates the story, that he had repaired it several times before, and in particular had done so not four years before the former occupant died.

At Tunbridge, England, in 1814, leaden pipes were used for conducting water; there were, after a few months, many cases of what is termed lead colic; one person who drank largely of water lost the use of her limbs for a time. Iron pipes were used to replace the lead ones, and immediately the colic disappeared. The water was analyzed by Mr. Brande, who found that it contained lead. Dr. Christison, who has carefully examined this subject, and from whose treatise on poisons the above cases are taken, expresses his conviction, after experiment, that the water supplied at Tunbridge could not pass through lead pipes or be stored in lead cisterns without becoming impregnated with lead. He also mentions another interesting case of a gentleman in Dumfriesshire, who resolved to bring to his house in leaden pipes the water of a fine spring on his estate, from a distance of three-quarters of a mile. He says, as I happened to visit him at the time, I took the opportunity of examining the action of a tumbler of the water on fresh-cut lead, and could not remark any perceptible effect in fourteen days. It appeared to me, therefore, that the water might be safely conveyed in lead pipes; and they were accordingly laid. No sooner, however, did the water come into use in the family, than it was observed to present a general white haze, and the glass decanters in daily use acquired a manifest white, pearly incrustation. On examining the cistern, the surface of the water, as well as that of the cistern itself, where it was in contact with it, was found completely white, as if coated with paint; and the water taken from the pipe, though transparent at first, became hazy and white when heated, or left some hours exposed to the air. On afterwards analyzing the water direct from the spring, I found it of very unusual purity, as it contained scarcely a 20,000th of solid ingredients, which were sulphates, chlorides, and carbonates. It is easy to perceive why the experiment, with a few strips of lead in a tumbler, was not a correct representation of what was subsequently to go on in the pipes; in fact, as the pipes were four thousand feet long, and three-fourths of an inch in diameter, each portion of water may be considered as passing successively over no less than 784 square feet of lead before being discharged. It will be seen from this case that although a chemist of great practical experience considered it safe to use lead pipes, judging from his experiments, yet, by the more perfect contact with the lead, the water was rendered unfit for use owing to its impregnation with the lead. The practice of using lead pipes for beer engines is most reprehensible, unless they are protected by some metal not acted upon by the acids of beer. Vegetable acids attack lead as they do copper; they should not, therefore, be allowed to come in contact with it, if they are to be used in any way as articles of food. Fats, also, exert a solvent action on lead, and this should be borne in mind; for although they are not as often exposed to its influences as they are to copper in domestic operations, yet there are occasions in which lead, and compounds of lead, are used in domestic utensils.

Pewter contains lead, and so do some of the glazes used to coat earthenware vessels; for the soft glazes used in pottery ware contain plumbic oxide. Dr. Beck relates the case of a family in Massachusetts, consisting of eight persons, who were attacked with colic, costiveness, and vomiting, and the disease was satisfactorily traced to a store of stewed apples, which had been kept some months in an earthenware vessel, and had corroded the lead glazing.

Another case is related by Dr. Hohnbaum, of Hildburghausen, of a family of five persons, who were attacked with colic and palsy. In this

case it was found that the vinegar for salad dressing was kept in a large earthenware vessel glazed with lead; and that, on analysis, one ounce of the vinegar contained nine grains of lead, and that the whole glazing of the vessel was completly dissolved. There is no doubt that if much oxide of lead is used in a glaze, it will be, in part at least, dissolved by the action of vegetable acids.

Snuff is generally preserved in lead to keep it moist; now the acids in the snuff, formed by the fermentation of the tobacco, act on the lead, so that the portion of snuff in contact with the lead gets impregnated with it. Snuff-takers should bear this in mind, as, on analysis, it has been found that very appreciable quantities of lead are contained in some kinds of snuff. Shot is used in cleansing bottles; great care should be taken to have them well cleansed after the shot has been used.

Milk, by standing in leaden vessels, has become poisonous. A case is recorded by Dr. Darwin, of a farmer's daughter who used to wipe the cream off the edge of the milk, which was kept in leaden cisterns, and being fond of cream, licked it from her fingers. She was seized with symptoms of lead colic, afterwards with paralytic weakness of the hands, and she died of general exhaustion.

Some lead salts are employed in medicine. The oxide is used for making lead plaster; the iodide, which is also used externally in ointment or plaster, is seldom given internally; the acetate is used internally, it has an astringent and sedative action, and is given in hemorrhage, and in diarrhœa and dysentery; the subacetate, known commonly as Goulard's wash, is only used externally as a lotion; and the carbonate, which is only employed externally. The carbonate of lead is used very largely in the arts, especially by painters; it forms the white paint of the house painter. The manufacture of carbonate of lead is very interesting; it is formed by a chemical process somewhat similar to that which takes place when lead is acted upon by water. Thin strips of lead are coiled up and placed, not in water, but in vinegar; the vinegar is contained in earthen pots, and does not entirely cover the lead; thin sheets of cast lead are used for this process, rolled lead does not answer as well; the pots are placed in rows and covered with boards, and are imbedded in speut tan or cow-dung. The rows are stacked one upon another, and the stacks often rise to a considerable height. The heat generated by the decomposing tan or cow-dung causes the vinegar to vaporize; this and the oxygen of the air acting on the lead forms plumbic oxide, which unites with the acid of the vinegar, forming a basic acetate of lead.

Carbonic acid is generated by the oxidation of the carbon of the tan or cow-dung, and this combines with the lead salt, forming plumbic carbonate and plumbic acetate. This acetate acts on more plumbic oxide, and basic acetate is again produced. The process continues till most of the lead is thus converted into carbonate. The carbonate formed is very hard, and retains the shape of the coiled metallic lead. It is ground by machinery with linseed oil, and in this way what is commonly called white lead is made. Sometimes it is ground with water, and then it is obtained, when dry, as a white powder. Carbonate of lead, when mixed with oil, saponifies to a certain extent, and is so rendered useful to the painter, for it gives what is called *body* to paints made with it. White lead is very generally adulterated with sulphate of baryta. White lead is also used for enamelling cards, to give them that glossy appearance so well known on the surface of visiting cards. From constantly handling carbonate of lead, painters and card-enamellers are subject to a disease called painters' colic.

Pure white lead dissolves completely in hydric nitrate; but if it is adulterated with sulphate of baryta, a white residue will remain undissolved, for that substance is not soluble in acid liquids. Acetate, or sugar of lead, has been more frequently taken as a

poison than any other salt of lead. It is not much used in the arts, but is more largely employed in those hair washes, which, it is said by their manufacturers, do not act as dyes, but by nourishing the roots of the hair, restore it to its natural color after it has become white. These hair washes consist of sugar of lead, glycerine, and powdered sulphur, and certainly have the effect of changing the color of white hair to a sort of brown. That they act as their makers state is very unlikely, and experiments which the author has lately made go to prove that they are, in every sense of the word, dyes. The lead becomes gradually converted into sulphide, and this, when in small quantities, has a brown tint; but in large quantities, is black, or nearly so. The hair, no doubt, absorbs the wash, and the lead salt becomes decomposed in the structure of the hair tubes, just as dyes do in the fibres of cloth or cotton, and so remains fast — *i.e.*, the color cannot be removed by washing. It is said that wines are sometimes treated with sugar of lead to destroy acidity, or to prevent them from turning sour. "At one time home-made British wines must have been frequently adulterated with lead, from the makers being ignorant of the dangerous nature of the adulteration. Sir G. Baker quotes the following receipt in a popular cookery book of his time: — 'To hinder wine from turning: Put a pound of melted lead in pure water into your cask, pretty warm, and stop it close.'" Cider formerly commonly contained it, owing to the lead used in the vessels in which it was stored or made.

A disease very similar to lead colic used to prevail in the summer-time in some of the cider districts of England; it was supposed to result from excess of cider drinking, but the subject was investigated in 1767, by Sir G. Baker, who found that the cider was impregnated with lead, and that this was sometimes put in on purpose to correct acidity. As recently as 1841, it was found that the cider drank in France contained lead, and produced lead colic. Red lead, or litharge, is generally met with as a dull reddish powder, but sometimes in rather bright scales; this latter form is owing to its partial fusion; it is used in glass making, and for imparting drying properties to oils. Boiled linseed oil is prepared with litharge. Red lead, or minium, is a mixture, in variable proportions, of the oxides of lead, viz., litharge and the binoxide. The binoxide is a brown powder, and can be separated from red lead by the action of hydric nitrate, which does not dissolve it, but which with the red lead forms soluble plumbic nitrate. Red lead is chiefly used as a pigment. When lead salts are taken, they are absorbed, and are found, on analysis, in some of the organs and tissues of the body; they also appear in the excreta; they act as irritants, though less powerfully than arsenic and mercury. The symptoms are pain in the throat, tenderness of the abdomen, colic pains, great thirst, cramps in the limbs, cold sweats, and constipation. When lead is slowly absorbed into the system, as in the case of painters or of those engaged in working in any way with lead, attacks of a disease which has received the name of painters' colic come on. This affection commences with violent pain in the abdomen. The pain seems to be greatest at the navel and about the pit of the stomach; it is invariably relieved by pressure, and, in this, it differs from the pain consequent on inflammation. There is often vomiting, but no fever or increase in the frequency of the pulse beats; on the contrary, they seem rather to diminish in number, and sometimes fall as low as between forty and fifty per minute. The pain about the navel is characteristic, it produces a severe grinding or twisting sensation, and the skin of the abdomen becomes tense. This colic is brought on by other causes than those mentioned. Sleeping in a recently painted room, drinking fluids which have contracted lead from the vessels in which they have been kept, taking snuff adulterated with lead, are causes of this disease. After several attacks persons sometimes suffer from what is called

lead palsy. The nerves of the fore-arm become affected, the muscles which extend the hands and fingers are paralyzed, so that the patient loses power over them, and the hand drops, — hence the name for the disorder "wrist-drop." Lead colic frequently accompanies this paralysis, and there is an unmistakable purplish line on the edges of the gums, where they are in contact with the teeth; this blue color is owing to the formation of lead sulphide, and is peculiarly characteristic of lead poisoning. Besides painters and those who take lead by the mouth, type-founders, glass makers, glazed-card manufacturers, and all workers in lead, often suffer from this disease. Dr. Guy states that he has seen two or three cases of lead poisoning amongst fishmongers, resulting from their handling lead counters covered with brine. Cleanliness is the best preventive of this disease, which sometimes terminates fatally if not checked in time, a species of apoplexy coming on accompanied by giddiness, weakness, and torpor, from which the patient dies convulsed and comatose.

In acute lead poisoning, after death, the large, and part of the small intestines are usually found to be inflamed, and the coats of the stomach disintegrated. The blood is sometimes found fluid, sometimes coagulated. The bodies of those who have died of lead colic do not exhibit these appearances; there are no effects of inflammation to be seen; in fact, there are no very constant morbid appearances, with the exception of constriction of the intestines, indicating contraction of their muscular coat. The sulphate of lead is very insoluble, so that soluble sulphates act as antidotes in lead poisoning. Louisa Wallace, aged nineteen, was admitted into hospital under the care of Dr. Thomson. An hour before her admission she had taken of sugar of lead, for the purpose of poisoning herself; about one ounce. In a quarter of an hour she vomited violently; sulphate of zinc was administered, also dilute sulphuric acid; on the following day she took sulphate of magnesia. The pain in the stomach, which she complained of, was relieved by two leeches, and one grain and a half of opium extract. In a few days she was discharged cured. The vomiting, in the first instance, was caused by the excessive quantity of the acetate taken, it acting as an emetic from its irritant quality. Her cure was doubtless owing to the sulphates given to her. Where no vomiting is induced by the poison, emetics should be given; zinc sulphate is the best, because lead sulphate is formed, and zinc acetate, the lead sulphate being harmless, and the zinc acetate acting as an emetic. The stomach-pump can also be used with advantage. White of egg and milk are very serviceable as antidotes, as lead forms insoluble compounds with albumen. Opium, with purgatives, is given with good effect in painters' colic and chronic cases of lead poisoning. The detection of lead is not difficult. If the acetate, in powder, be heated, it melts; if the application of heat be continued, it becomes charred (in this treatment it differs from tartar emetic, which does not melt, but decrepitates). If the heat be continued, a globule of metallic lead is formed by the reducing action of the carbon of the acetate; under similar circumstances, a globule of antimony is obtained from tartar emetic; but there are very distinct differences to be observed between the behavior of it and the tartar emetic: the odor from the tartrate is like that of burnt sugar, that from the acetate is of acetic acid; and, again, if the globule of antimony obtained be struck, it breaks instantly into glistening fragments, whereas the lead is flattened. If the powdered acetate be treated with ammonic sulphide it turns black; so does the carbonate of lead, and in this it resembles corrosive sublimate, and differs from tartar emetic when heated. Plumbic carbonate differs from the acetate in that, by losing carbonic acid, it becomes plumbic oxide, which is of a dirty brickdust color, and which, by further heating, is fused, not reduced, to metal. Acetate of lead is very soluble in water; in a solution of a lead salt, hydric sulphide pro-

duces a black precipitate, if the lead be present in quantity, but brown if there be only a trace of it. In a specimen of water containing a very minute quantity of lead, this gas produces a brown discoloration. Lead sulphide, when treated with hydric nitrate, is decomposed, lead nitrate being formed and sulphur set free, some of which, being oxidized by the nitrate, forms sulphuric acid, which, with lead oxide, forms lead sulphate; and as this is a white insoluble powder, a white cloudiness, and eventually a precipitate, almost invariably attends this reaction.

With hydric chloride, soluble lead salts, if they be present in tolerable quantities, give a white crystalline precipitate, soluble on boiling, but which reappears when the liquid cools. Plumbic chloride is only slightly soluble in cold water, hence the precipitate; but, as it is soluble to a certain extent, no precipitate is formed by hydric chloride if only a small quantity of lead salt be present. Potassic iodide throws down a beautiful yellow precipitate from solutions containing lead. When warmed with sufficient water, the iodide of lead dissolves, but on cooling it reappears in beautiful yellow metallic-looking scales. This test is highly characteristic, and when obtained proves absolutely the presence of lead. This reaction may be applied to a dry acetate of lead, just as it is applied to corrosive sublimate. Caustic soda precipitates plumbic hydrate from a lead solution, which is dissolved by excess of that reagent. Hydric sulphate also throws down a white precipitate of plumbic sulphate, soluble in ammonic acetate. If in a solution of a lead salt a piece of metallic zinc be placed, the lead is deposited in very beautiful arborescent forms on the zinc; and this method is used to detect lead; even when present in very small quantities these forms may be seen by examining the fragment of zinc under the microscope. Red wafers are colored with red lead; if one of these be burned, with care, a globule of metallic lead will be obtained. If a powder is supposed to be oxide of lead, or to contain it, if it be heated with charcoal in the reducing flame of the blow-pipe, lead will be obtained; or, if it be treated with hydric nitrate, the solution will give all the reactions already described. Lead can be separated from other metals: first, from antimony and arsenic, by the insolubility of its sulphide in ammonic sulphide; from mercury, by the solubility of its sulphide in hydric nitrate; and from copper, by treating a solution containing nitrates of the two metals with hydric sulphate, which precipitates the lead, but leaves the copper in solution.

From an article by F. S. Barff, M.A.

DAMP HOUSES.

THERE can be little doubt that damp is one of the most formidable enemies to health which our climate harbors. We are not far enough north for piercing cold to be habitually or seriously dangerous. We are not far enough south to be subject to the fevers, malaria, and sunstroke of hotter climates. But the list of ills arising from the moisture of our climate is a long one; it embraces the various forms of phthisis and rheumatism, and includes some ailments, such as coughs and colds, from which it is no exaggeration to say that not one in a thousand is exempt.

Our dress and our dwellings, our food and our habits of life, ought to be specially designed to protect us against inclement weather and its consequences; and no doubt to some extent they are so, but not in anything like an adequate degree; and it is notorious that our houses especially stand in need of improvement in this respect. This might easily take place if public attention were sufficiently directed to the necessity for it, and a dry house became an object of constant demand; but so long as the persons who take houses will rest quite content with their being roomy, well arranged, and pleas-

ant looking, without much thought as to whether they are likely to prove dry and healthy,—so long will the majority of builders continue to neglect precautions which cannot be observed without some expense, and attention to which does not, they find, add to the money value of the houses that they erect. The first step to improvement in the average dwelling-house is to create, if possible, a state of public opinion such as would render a badly constructed house an unmarketable article.

Damp, when it enters a house, comes in at the roof, at the doors and windows, through the walls, from the ground, or through leakage of pipes. The entrance of damp through the roof itself is fortunately so unpleasantly conspicuous, owing to its staining the ceilings, that it is not long in being found out, and before repairs more or less complete are made. But for this, roofs would be more commonly untrustworthy than they are, and injury to health and life would oftener occur through their failure. Many roofs are, however, so constructed that, in times of great rain and of snow, an inundation is almost inevitable; and the situation of such houses as are near trees exposes them every autumn to the danger of overflows from gutters stopped up with dead leaves. Roofs, to remain dry, should be of sufficiently steep pitch for the nature of their covering. Whatever the covering, the materials should be good, and well secured. Roofs should be so arranged as to dispense, as far as possible, with gutters and flats occurring in the middle of the building, but should, if practicable, throw off the whole of their water to the sides. The points where they join walls, parapets, and chimneys, are especially vulnerable, and should be especially protected, either by a lead "flashing," or by a cement fillet with a small projection formed to overhang it in the brick-work. It is essential that slates should overlap one another sufficiently, and that, if the covering is of metal (as lead, zinc, or copper), it should be so laid as to be free to expand or contract with change of temperature.

Where a roof is found to be defective, the fault is commonly due to broken or ill-secured slates, to defective covering to the joints next the walls, or to badly arranged gutters. In some cases it may be necessary to rearrange the construction of the roofing, with a view to throw off the water more completely; but in the majority of instances the remedy is to replace bad materials and workmanship with better ones.

For the same reason which makes the defects in a roof comparatively harmless, from our present point of view, defects in doors and windows, though certainly injurious, are not the worst of faults; for leaky windows, like an unsound roof, occasion discomfort when it rains, and they are therefore likely to be found out and remedied. Our sash window, the ordinary kind in use, is well contrived for keeping out rain; when well made of seasoned materials, a sash window is, without doubt, a perfectly weather-tight contrivance; and even when badly made it is superior to a bad casement. Where casements are employed, the most weather-tight construction is that which is universal in France. In this arrangement the window is divided into two folding casements, or glass doors, meeting in the centre, and both opened or closed at the same time; the joint being made tight by the edge of one casement being rounded, and the corresponding edge of the companion one hollowed. A projecting fillet of wood, so arranged as to throw off the water which in wet weather drains down the face of doors and windows, is an excellent precaution against the entrance of moisture; and, where a somewhat expensive expedient can be adopted, the mechanical contrivance called a "water bar" is often successful in keeping out the weather at external doors and casement windows. For the ordinary leaky joints which constantly have to be encountered in some rough and ready way, there is no packing better than a piece of india-rubber tubing, nailed up against the edge of the defective joint. The enemy, however, attacks us openly when it comes in at the window or the roof; and the shape in which it shows itself—that of a

stain or a pool of water — is a palpable guide to the locality where the defect is, and often furnishes a clue to the mode of applying a remedy.

Where moisture penetrates the walls, the case is widely different. The harm done is insidious; it may go on long without being detected; and when perceived, it may be difficult to find out how the mischief arises, and almost an impossibility for even an experienced person to devise a remedy. It must be recollected that nearly all the materials used in building are porous, and consequently absorbent of moisture; many of them are pervious to wet to an extent little suspected, and in not a few instances they are even hygrometric. A driving wind and rain, in an exposed situation, will blow through many kinds of stone walls, and certainly through any sort of brick wall, if of moderate thickness and solid build; and a wall built with sea-sand contains in its very mortar joints a material which has a constant tendency to absorb moisture. Further, many a wall which can withstand the ordinary attacks of rain falling against it, will give way before a stream of water poured down upon it at a given point; and it constantly happens that the arrangement of our houses is such as to give opportunities for this to occur somewhere or other. Lastly, bad workmanship, or unskilled use of materials, will make defective walls out of even good bricks and sound stone.

It is then of the first importance, if a house is to be dry, to know how far the materials with which we propose to build will turn water, and if we find we cannot rely upon them to do this, to understand how to remedy their defects; for the same bricks or stones which, built up in one way, will form but a damp wall, may often be made, by other modes of handling, to resist weather thoroughly.

Chilblains and Chapped Hands. —The returning cold, damp weather brings in its train the seasonable series of complaints, such as chilblains, chapped hands and lips, etc. These appear to be most prevalent amongst those exposed to the inclemency of changeable weather, who possess a fair complexion, delicate skin, and other constitutional predispositions. To those specially liable to these tiresome and painful affections, the wearing kid-skin gloves, lined with wool, may serve as a preventive, which not only keep out the cold, but absorb any moisture that may be upon the hands; and rubbing over the hands before washing a small quantity of glycerine, which should be allowed to dry or become absorbed to a partial extent, will prove beneficial. When chilblains manifest themselves, the best remedy not only for preventing them ulcerating, but overcoming the tingling, itching pain, and stimulating the circulation of the part to healthy action, is liniment of belladonna (two drachms), liniment of aconite (one drachm), carbolic acid (ten drops), to collodion flexile (one ounce), painted with a camel's-hair pencil over their surface. When the chilblains vesicate, ulcerate, or slough, it is better to omit the aconite, and apply the other components of the liniment without it. The collodion flexile forms a coating or protecting film, which excludes the air, whilst the sedative liniments allay the irritation, generally of no trivial nature. For chapped hands, the free use of glycerine and good olive oil in the proportion of two parts of the former to four of the latter, is excellent; after this has been well rubbed into the hands and allowed to remain for a little time, and the hands subsequently washed with Castile soap and tepid water, the belladonna and collodion flexile may be painted, and the protective film allowed to permanently remain. These complaints not unfrequently invade persons of languid circulation and relaxed habit, who should be put on a generous regimen and treated with ferruginous tonics. Obstinate cases are occasionally met with which no local application will remedy, until some disordered state of system is removed, or the general condition of the patient's health improved. Chapped lips are also benefited by the stimulating form of application, but the aconite must not be allowed to get on the lips.

DISADVANTAGES OF A POTATO DIET.

EVERY known article of food fulfils, more or less perfectly, the conditions incidental to a proper diet. Sugar alone, protein starch, or fat alone, could not support life; but a combination of two or more alimentary principles, with an adequate selection of what are called regulators, contains the elements necessary for the nourishment of animal and man. We have before us an article by a German professor, Dr. Artus, of Jena University, in which that gentleman undertakes to show that potatoes in themselves do not contain such ingredients as are required for the healthy sustenance of the animal frame — in fact, that a strict potato diet is fatal to the continuance of life. He says that in the nutrition of men, as well as of animals, the generation of blood must be considered as of primary importance, since from that source are derived, not only the tissues, nerves, brains, and muscles, but also all solid parts of the body. The blood itself is to be regarded as a combination of sugar, fat, albuminous and saline matter. Now, since food has to provide these materials, it is evident that it must contain such substances as will either fulfil the function of fat producers (such as sugar, starch, etc.), or provide albumen, fat, and saline matter. The articles used as food rarely contain these ingredients purely, and it is hence necessary that, through the process of mixing them with saliva, gastric juice, etc., — in fact, by what is termed digestion, — they should be transformed into components of blood. If we feed an animal with articles showing no resemblance to such components — if, for instance, we take the *amyleon* (starch), which forms a principal part of the potato — an operation of the juices begins, which transforms the amyleon into sugar, and, by-and-by, through the action of the bile, the pancreatic and intestinal juices, ultimately into fat. Since the latter is found in the blood, we have to reckon starch as well as albuminous matter, such as legumine, gluten, etc., among the blood generators. It seems inconsistent to classify fat with the agents of restoration. A knowledge of the above metamorphoses will enable us to comprehend the position of the suckling with regard to its only food, the milk; for we perceive that the casein (that portion of the milk containing nitrogen), by digestion, is transformed into albumen, and further, by the process of respiration, into fibrin, which is partly found dissolved in the blood, but which is also found as muscle in the fleshy parts of the body.

The above allusions will enable us better to understand the following considerations bearing upon the questions before us: "By request of the Gardeners' Association (*Garten-Bau Verein*), I (Dr. Artus) analyzed twenty-three different kinds of potatoes, reared under varied conditions of soil and manure, and I found that in 100 parts of peeled potatoes there were 0.76 to 1.52 albumen. The latter figure was obtained from a specimen cultivated with fresh manure. The 2.78 to 3.89 per cent. ashes, which I obtained by drying the different samples at 110 degrees C., contained but trifling amounts of phosphates. From these data it is apparent that potatoes do not supply the body with that which it essentially requires. If flesh is to be made as well as fat, and in due proportion to the latter, then such elements should be supplied as will introduce the necessary albumen and saline matter.

Treating the subject with regard to the feeding of animals specially, a few hints might be given as to the most profitable proceeding in the matter. Where milk is of little value, an addition of that article to the steamed potatoes would serve the purpose; but where milk is rare, or where it is more profitably turned into something else, another means of supply will have to be devised. Bones (remains of joints, etc.) yield a very appropriate companion to the potato diet. They, of course, have to be prepared; and that is done by boiling or steaming them in the first

instance, so as to remove all fat, after which they have to be dried and ground into a fine powder. The phosphate of lime and a kind of albuminous substance which they contain make the bones productive of exactly those essentials in which the potatoes are deficient, namely, albuminous and saline matters. An improvement can be effected by pouring 1 lb. of hot water over 1 lb. of ground bones, adding the same quantity of milk. The mixture ought to remain in a tolerably warm place for eight days, during which period it is to be stirred occasionally. Half a table-spoonful of this preparation will be found to be an adequate addition to the quantity of potatoes sufficient for a meal.

Preservation of Eggs.—The method of preserving eggs has attracted much attention, and as it is a very important matter in a culinary point of view, it will not be uninteresting to detail the result according to the best authorities. The old mode of packing the eggs in earthenware vessels, and covering them with lime-water, or rather milk of lime—that is to say, a solution of quick-lime—is found, after a time, to alter, not only the shell, but also the yolk and the white of the egg. To avoid that inconvenience, the two following modes are proposed:—

1. Take 400 parts of water, 1 of cream of tartar, and 2 of slacked lime; stir the cream of tartar with the water till the salt is dissolved, and then add the lime. Let the solution subside, and cover the eggs with the clear liquid; after a short time the shells will be covered with small crystals, which is a sign that the preservation has been accomplished. 2. To 400 parts of water add 16 parts of lime, 3 of saltpetre, and 16 of salt; boil the whole for twelve or fifteen minutes, and, when cold, pour it upon the eggs, placed with the small end downward in an earthenware vessel, lined with lead glaze, which is to be kept in a cellar. Another method in use is to spread a layer of finely-powdered rock-salt, as free as possible from magnesian salts, which are too hygrometric, and place the eggs in this so that they do not touch each other; then to fill in fine salt between and over them, and so pack the case with alternate layers of eggs and salt. The experiments of a large egg merchant have led him to the conclusion that smearing the eggs with linseed oil is the most simple method of all, and sufficiently protective. Other persons prefer beef-fat for the same purpose.

Locality of the Sense of Taste.—Dr. Camerer gives the results of his experiments on the locality of the sense of taste. He finds that the sensitiveness of different parts of the tongue depends essentially on the presence and number of the fungiform papillæ (the very small elevations on the surface of the tongue). These are most abundant near the apex of the tongue; they are less numerous at the edges of the organ, and disappear near the circumvallate papillæ. There are no papillæ on the under surface of the tongue. The mode in which Dr. Camerer conducted his experiments was to press a tube of about one-third of an inch in diameter over different parts of the tongue and adjoining mucous membrane, and then to pour in a solution of the sapid substance to about the height of a quarter of an inch. Nine persons were experimented on, and the subject of the experiment did not in any instance know beforehand the nature of the solution the taste of which he was called upon to determine. The substances employed were common salt, sulphate of quinine, sugar, and sulphuric acid. From his experiments it appears that the parts of the tongue that are free from papillæ possess no sensibility; also, that a weak solution of a salt is more readily perceived after pure water has been tasted than after a strong solution has been tasted during the previous twenty-four hours. By touching the fungiform papillæ with a fine spiculum of salt crystal, he was able to show that the gustatory sensibility resided in the fungiform papillæ themselves, and not in the adjoining mucous membrane.

SQUINTING EYES:

WHY AND HOW THEY MUST BE OPERATED ON.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

IN order to understand how and why an eye squints, as it is called, that is, turns in or out away from the direction in which its fellow eye is looking, we must have a clear idea of the muscles which move the eyeball, and see just how they effect this motion. The human eye has six muscles attached to it. Four of these are called the straight muscles, because they run straight backwards from the globe to the back part of the orbit, where they are attached to the bone. The other two are called the oblique muscles, because they run obliquely, as it were, to the eye. The straight muscles are attached above, below, to the inner and to the outer side of the eyeball. The upper oblique muscle is attached to the outer and back part of the eyeball, and the lower oblique to the outer and lower part of the globe. These muscles and their attachments are readily seen in the accompanying figure. We have the right eyeball with the cornea A

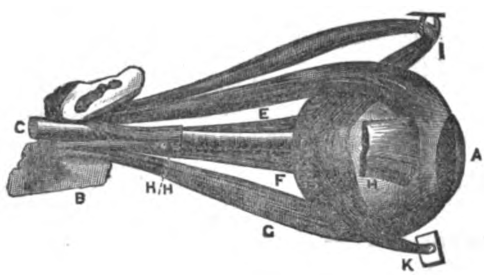


Fig. 1.

in front, and the optic nerve running from it to C, where it is cut off. E, F, and G, are respectively the upper, inner, and lower straight muscles. H H is the outer straight muscle, cut off at H, to exhibit the inner one. I is the superior oblique muscle, where it runs through a sort of pulley on the inner and upper part of the orbit. K is the attachment of the lower oblique muscle at the inner and lower corner of the orbital edge. B is the bony apex of the orbit, where all but the lower oblique are attached, since the upper oblique, as is seen, runs through the pulley backwards, to be fastened to the bone near the others. All this will be still more apparent by reference to *Fig.* 2, further on in this article.

Now, in general terms, the four straight muscles move the eyeball in the direction indicated by their names, i.e. upwards, downwards, inwards, and outwards, arranged in corresponding pairs;

therefore, whilst one is contracting the opposite one must relax. The two oblique muscles, also, form an antagonistic pair, and their effect is to rotate the eyeball around its axis, or a line drawn from the centre of the cornea, or front of the eye, through the centre of the globe, to the back of the eyeball. The upper oblique, also, turns the cornea downwards and outwards, and the lower oblique up and outwards. The reason the muscles, when contracting, do not move the eyeball from its position in the socket, but simply rotate it, is, that, as is seen in *Figs.* 1 and 2, the points of insertion of the muscles in the eyeball are in front of the transverse diameter, curving over the convexity of the eye. When in action, each muscle's effect must therefore be to turn or rotate the globe, so that the cornea will be directed either upwards or downwards, outwards or inwards, as the name severally indicates. If any two adjoining straight muscles act together, the cornea will be turned to a point intermediate between those to which they would direct it if they acted separately. Thus the upper and outer straight muscles acting together, turn the cornea upwards and outwards; the lower and inner muscles turn the cornea downwards and inwards. By this succession and combination of action, the muscles are enabled to turn the eye, with the minutest precision, to every point in the field of view. This general idea, although not the whole or exact effect of the muscles of the eye when in action, is sufficient for our present purpose. A single nerve coming from the brain, directs the action of the upper, lower, and inner straight, and lower oblique muscles. Another distinct nerve coming from the brain, directs the outer straight muscle, and still a third from the brain, governs the upper oblique. Compared to the work to be done, namely, simply the rolling of the eyeball round its centre, these muscles are very large and strong, and seemingly more numerous than need be, since four could effect the same motions. It must be remembered, however, that except during sleep, the eyeball hardly ceases motion for an instant. The arm, although largely supplied by strong muscles, could not be kept in such constant motion without fatigue, whereas we never notice any effort in turning the eyes, what is called fatigue of the eyes coming from a very different source, namely, continued muscular effort within the eyeball to accommodate our sight for the work employed at the time.

But we have two eyes, and to see objects singly and clearly, we must keep both the optic axes pointed to meet at the object looked at. Therefore, if we look to the left, the *outer* straight muscle turns the *left* eye in that direction, whilst the *inner* straight muscle turns the *right* eye towards the same point. Moreover, when the optic

axes are correctly pointed to meet at the object looked at, the eyeballs must also have the same degree of rotation around their optic axes. This is more readily understood if we imagine a vertical plane passing through the two optic axes, like meridians. These two meridians, or vertical planes, must always be kept parallel, to insure our seeing things singly. If they are not parallel, we see things instantly double; a pen-handle held before the eyes will appear to have another one at its side, inclined towards the first. By shutting each eye alternately, we find to which eye each image belongs. Now this constant parallelism of the vertical meridians is kept up by the action of the oblique muscles, assisting and correcting the action of the others. The necessity for the large number and peculiar character of the ocular muscles is thus rendered more comprehensible.

For each and every position of an object in front of us, or, in other words, for each and every direction of the optic axes, there is, of course, a corresponding definite action of each ocular muscle. Any excess of action or want of action of a single muscle, or of several muscles, produces double sight at that point of our field of vision, to turn the eye towards which these muscles are called into play. Hence the reverse holds true, namely, if in any part of the field of vision an object appears double, and these two images have certain inclinations towards each other, we can decide that certain muscles are paralyzed, or fail to do their work, or their opponents act too strongly. It is, in fact, by the peculiar position and relations of double images when seen, that ophthalmic surgeons decide what muscles are affected, and how and when to operate, in order to remedy the evil by restoring the mutual action of the two eyes, and thus give the patient single vision again.

Now squinting, as I said, was the inability to direct or converge the two optic axes on the object; whilst one is pointed at it, the other is turned in or out beyond it, according as there is converging or diverging squint. But persons who squint continually, rarely see objects double. Double vision is such an annoyance, and source of danger even, that a person affected by it is always anxious for its immediate relief. How do squinting people get rid of it? Why, by simply seeing with the one eye, or mentally suppressing one image, as it is called. A watch-maker, engraver, or wood-cutter, working with a single magnifying glass, does not need to shut the other eye. He simply suppresses the image, or disregards it, although, of course, it is present on the retina. The same with the use of the telescope, microscope, or ophthalmoscope. It is a power readily learned, and

should always be employed, since it avoids the muscular effort and consequent fatigue from keeping one eye closed. Any one trying, will be surprised how soon they can acquire this power of suppressing one retinal image, whilst we regard or take cognizance of the other alone, as the person affected with squint must of course do, or he would otherwise see double. There is, however, this difference between a person who squints, and another using but a single eye at a time; namely, that the squinting person *constantly* suppresses one retinal image, or, in other words, fails to use the eye which turns in or out to see with, the other alone being employed. Here, then, we have finally arrived at the practical point of this article. Whenever an eye turns in or out, away from its fellow, and the retinal image is consequently suppressed, *the power of sight begins to fail in the eye, and goes on decreasing till it is almost blind, or can only distinguish large objects.* The other eye may remain perfectly good, but of course all the work is thrown upon it. The absolute necessity, therefore, of remedying squint, is at once apparent. Children who squint should be operated on whilst young; I mean at four or five years of age, for thus only can we make the eyes do their work together, and prevent the loss of sight sure to follow. Moreover, if there has been some loss of vision in the squinting eye, it will return in whole or in part, when it is again brought to act with its fellow. This is a fact only known and understood in quite recent times — I mean the last few years. It was a powerful cause to throw discredit on the operation for squint in adults, since the patients did not, at any rate at first, see any better after than before operation, or, what often occurred, the patient did not know that he could not see well with his squinting eye, and first tried it alone, perhaps, after the operation for squint had been performed, naturally, therefore, accusing the operator of having partially destroyed his sight in that eye. From what I have now said, the whole truth can readily be understood by any one, and need be only told to be comprehended perfectly.

Now as to the causes of squint. There is much credulity and ignorance on this subject in the community, and I desire, therefore, to be clear and explicit in my description of the causes of squint, which, we shall see, are quite different from those generally supposed. When an eye, from paralysis of several of its muscles, is fixed in any given direction, and cannot move with the other, it was formerly also said to squint; but nowadays, by squint, of course we mean an inability to bring both visual lines or axes to bear simultaneously upon one point, the one always deviating in a certain direction

from the object. The community generally, and often physicians also, are apt to attribute squinting to all sorts of causes, frequently, in fact, to anything which is sufficiently prominent in the child's life to have especially attracted the attention of the parents or attendants. Diseases and injuries of the brain may sometimes produce squint. Squinting may be acquired by a child imitating another whose eyes are turned. A trick of looking at the nose may produce it, as also many repeated attempts to see how near an object can be brought to the face and still be seen, played as a "game" in some schools. Paralysis of any ocular muscle, from injury or disease, may cause squinting. An opaque spot on the cornea may induce the eye to turn in or out, in order to allow the light to pass by it to the pupil.

The two most frequent forms of squinting, namely, simply *converging* and *diverging*, are due to very different causes than the above. Probably eighty per cent. of all cases of converging squint are caused by over-sightedness, or *hypermetropia*, as it is technically called. What this is, I have previously explained, but I will repeat here that it arises from the eyeball being too short from before backwards, so that rays of light cannot be properly focused on the retina without an excessive strain on the muscular power in the eye, which enables us to adjust it for near objects. It is relieved by a convex glass placed before the eye. A child even at seven to ten years of age, who is over-sighted, may require the spectacles which his father, or perhaps grandfather, uses. When we look at near objects we converge the eyes, of course, and with this act is intimately associated this power of adjustment. The more we turn the eyes in, the more we can adjust them for near objects, or accommodate, as it is called. The over-sighted person must accommodate strongly; therefore he lets one eye turn in further than the other, i. e., he squints. This would make him see double, and to obviate that, he *suppresses the image* in the squinting eye, as I have already described. The moment this happens, the squinting eye begins to lose its power of sight, which, as I have said, may increase to almost total blindness. Squinting from over-sightedness may be cured in its first stage by wearing appropriate convex glasses, which neutralize the over-sightedness. When the squint has become permanent, the inner straight muscle of the eyeball becomes shortened, and its opposite one weakened, so that it can no longer pull the eye outwards. In this condition nothing can be of avail but the operation for squinting, shortly to be described.

Just as over-sightedness, or *hypermetropia*, causes *convergent* squint, so near-sightedness, or *myopia*, when excessive, produces divergent squint. In near-sightedness the eyeball is too long, and, on account

of its ellipsoid, or egg shape, its range of movement is limited, especially inwards. A very near-sighted eye must, however, have the object very close, and, of course, turn the eyes proportionately inwards. This causes exertion and fatigue, to relieve which one eye is allowed to deviate outwards, whilst the other turns inwards. Here, too, the person will have double images, and gets rid of that annoyance by, as in the converging squint, mentally suppressing the image of the squinting eye, which soon also begins to lose its power of sight, till almost blindness ensues.

All these facts are the result of recent investigation. The operation for squint was first done to remove the deformity, and all squinting eyes were indiscriminately operated on. Naturally the results were often quite unfavorable, so much so that the operation gradually fell into great disrepute, and began to be neglected. The operation is not generally of itself a very difficult one, but there are many cases which require great care, exactness, and expertness in the previous examination of the eyes, the investigation of the character of the squint and its amenability to treatment, as also in the precise mode of operating. These are some of the most difficult problems the ophthalmic surgeon has to solve. The present operation for squint, means the bringing back the two eyes to see together and move in consort; quite a different thing, and more difficult task, than the former idea of simply removing a deformity.

It is only about thirty years ago that the operation for squint was first successfully performed. It is not now, as then, always practised, since there are some methods of relieving slight forms of squint without operation. These I cannot here enter into, as they would not be readily understood, except by those familiar with the whole subject. We owe it to the late lamented Prof. Græfe, of Berlin, to have rescued the valuable operation for squint from being neglected or entirely thrown aside, and this not by any special perfection in the carrying out of the operation, but by the scientific study of the optical condition of the eyes, and the causes leading to their unequal convergence or divergence. But it requires years of special study to enable the ophthalmic surgeon to acquaint himself with these investigations, so that he can apply the laws deduced in any given case, and thus successfully examine and operate on a squinting eye. The general surgeons do not of course follow such special studies, and it cannot be expected of them so to do; hence their lack of success with the squint operations, which they finally almost ceased to perform.

It remains for me, finally, to describe the operation itself, which may readily be understood with a little attention to what here follows.

First we must have still a little better idea of the anatomy of the parts concerned.

In *Fig.* 2 we have, of the natural size, a horizontal section just

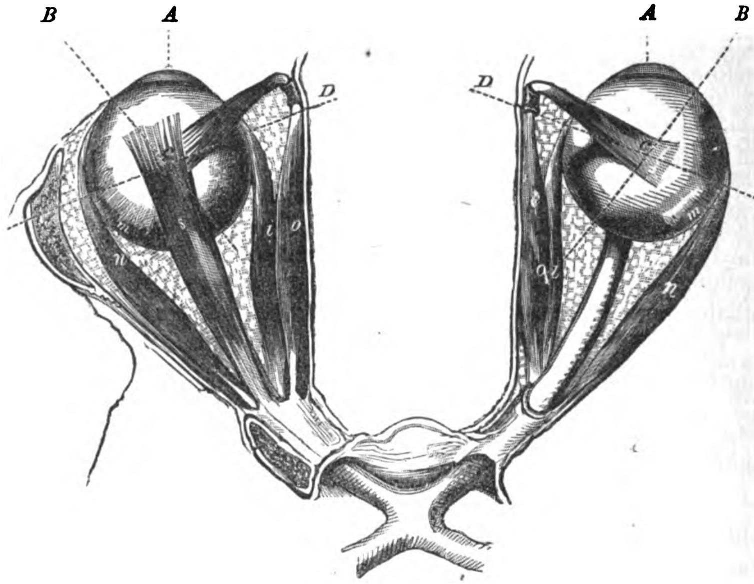


Fig. 2.

above the eyeballs, which we see with the optic nerves going from them to pass inside the skull, where they join and intermingle. The space between D D is the cavity of the nose; A A are the lines of the optic axes; n n are the two outer straight muscles; i i the two inner straight muscles; o o are the two upper oblique muscles. The two lower oblique muscles of course cannot be seen from this point of view, which is from above; we see, however, where they are attached to the globes at m and m. In the left eye, s is the upper straight muscle, which, in the right eye, has been removed to show the optic nerve. c c, where the two dotted lines cross, are the centres of motion of the globe. The dotted lines B B are the axes around which the oblique muscles move the globe. The dotted lines D D are the axes around which the upper and lower straight muscles move the globe. The axis of motion of the outer and inner straight muscles is a vertical line through the point c. In the right eye, the outer portion, or wall of the orbit, is removed. The operation for convergent squint, is to cut the tendon of the inner straight muscle where it is attached to the eyeball, just where the dotted line D crosses it in the figure. The muscle then draws back and attaches itself again to the

globe, whilst the eye turns out to correspond to the other. When the eyeball turns out, or divergent squint, then the operation is to cut the inner muscle as before, bring the end forwards and attach it to the globe — cutting, perhaps, also the outer straight muscle just where the dotted line D crosses it in the right-hand eye. I trust, therefore, that this description may serve, in some measure, to remove the wide-extended ignorance and credulity of the community as to the operation for squint; and that quacks and charlatans will no longer succeed in persuading their clients that the eye is taken out and replaced, or that cords are cut, and all such nonsense. Let every parent and guardian remember that a squinting eye means something — that sight is being lost in it; and that the sooner some ophthalmic surgeon —*not an advertising one*— examines it, the better. In these days of ether, there need be no dread of pain or suffering for the child or adult, either from the operation or afterwards. They can be freed from a deformity, and vision saved in the squinting eye, by an appropriate and properly-performed operation.

COUGH.

"I HAVE got a cough. What shall I take to cure it?"

Most of us are ready with an immediate and confident answer to such a question; but the doctor will not prescribe till he has asked a number of questions, which seem to have no more to do with the cough than with his wooden trumpet, or stethoscope, which he so provokingly persists in putting to every out-of-the-way part of the chest, while he makes us strip off our wraps and ruffle our smooth linen.

What we want is to have the cough cured; we don't want to be told that the "bronchial membrane is irritable, and that we must give up our evening parties or evening church," still less that the cough is due to a gouty tendency, and that we must avoid meat suppers and porter, port wine and filberts.

We want some physic to cure the cough; we do not want our pleasures and enjoyments limited, or to refrain from the very things we most relish.

People know what they mean by "disease"; it is unease, disturbance, pain. Doctors look on these things as "symptoms" of the real evil to be combated. That which the patient thinks of absorbingly, the skilful practitioner only regards so far as it serves to indicate how and in what part the body is affected. What, then, can be more natural than that the patient, finding his immediate needs are not responded to, goes in quest of one who is ready to promise immediate cure of every symptom. Hence it comes to pass, that quacks thrive because they supply exactly what is asked for, although they have not the ability to discover the cause and nature of a disorder. Hence arises, also, the very common belief in "patent medicines" and "infallible specifics."

It is the habit of the trained physician to look more to the hidden causes of disease than to the surface symptoms; but the patient thinks only of the removal of the symptoms. An illustration will explain our meaning.

A coughing patient applies to a doctor of the old-fashioned school. The cough is found, on inquiry, to be dry

and spasmodic, and some medicine is given to loosen the dry cough and control the spasm, or, to use the technical terms, an expectorant and anti-spasmodic mixture (for example, squill and prussic acid) is prescribed.

If the sufferer apply to a somewhat more modern practitioner, he will be questioned as to the origin and duration of the disorder, and, perhaps, the ear will be applied to the chest, and the throat looked into. The patient is told that he has "bronchitis" or "enlarged tonsils," and must apply the remedies proper for these affections.

But, if our patient consults a physician of the modern school, his voice-box and windpipe will be scrutinized with the aid of a lamp and mirror (laryngoscope); his chest will be "explored;" it will be "percussed"—"thumped," as he calls it—and listened to with the stethoscope (auscultation); its size and movements will be measured. Nor is this all. The doctor must needs inquire all about the ancestors—whether the father was asthmatic or the mother consumptive—and may even want to know about the aunts and uncles, brothers, sisters, and children. He asks whether the occupation is a dusty one, whether the residence is in a damp or bleak locality, the rooms ill-ventilated or gas-lighted, what have been the previous illnesses, the diet, times of rest and exercise, and fifty other seemingly inquisitive questions, which our old-fashioned friend would never have dreamed of. At last he comes to the conclusion that there is a red spot near the vocal cords—"a granulation on the aryteno-epiglottidean fold"—or that an out-of-the-way lobe of the lung has lost its elasticity, owing to the fact that, in consequence of a fractured rib years ago, that part has been left prone to disease; the house being damp, and the clothing defective, rheumatic condensation ("fibroid proliferation") of the lung has occurred. He orders an inhalation of "atomized" caustic, applies mustard leaves to the skin over the affected portion of the lung, orders lithia water with meals, change to a dry house and a sandy soil, to leave off singing and loud talking, and many other things which it is very hard to do, and all this when what was needed was simply a remedy for a cough!

Can we wonder, then, that the patient who wants his cough cured will seek the doctor who undertakes to cure it off hand, rather than one who devotes his attention to ulterior matters which the patient does not wish to think of?

Whence can we look for a remedy for this state of things? Must the doctor imitate the eminent counsel in the story, who imbibed unlimited libations of porter "to bring his intellect down to the level of the judge's," and, instead of doing what he deems to be best, give the patient what he asks for? Let us hope rather that an improved knowledge of the human body and its needs, such as our better schools are beginning to supply, will prove the true remedy, and that the public will, ere another generation has passed away, possess that appreciation of the first principles of dietetics and sanitary science, which will enable them rationally to judge between the straightforward recommendations of the practitioner of common-sense medicine and the inflated mysticism of the tyro and the quack.

The old-fashioned doctors often, it is true, made up by discrimination what others gained by scientific methods, and secured perhaps better results than those who were guided by the new lights. Yet the right use of instruments of precision—such as the stethoscope, microscope, or thermometer—must be of real advantage. Facilities for the discovery of changes in the body ought not surely to make men worse practitioners; and is it not wiser to submit to the elaborate scrutiny of one who will overlook nothing, rather than trust to the "lucky guess" and hap-hazard dose of the self-confident practitioner?

We cannot attempt to give any suggestions as to the pratical methods of dealing with cough in its many forms, until we have said a word or two on the structure and function of the parts involved, and of the organs which have

to do with the act of coughing. Let us first see what cough is.

In the act of breathing we take air into the lungs and then expel it. If the air is impure or dusty, it irritates the sensitive lining of the air-passages, and produces cough, which differs from ordinary expiration in that it is violent, sudden, and noisy, instead of gentle and noiseless. The air is quickly and deeply drawn in, and then violently and explosively expelled, and with the air any accumulated or irritant matters are expelled too.

If a grain of dust gets into the eye, an immediate contraction of the lids ensues; so with the bronchial membrane, the presence of an irritant is the immediate determining cause of cough, which is really nature's effort to get rid of the evil. Such being the case, it needs no great penetration to see that what we want is rather to encourage than to interfere with the effort of nature, yet this last is the very thing that an ignorant patient often demands.

The nerves, which act as sentinels, and convey information of the presence of foreign matters, may also be irritated in other ways, as by teething in children, or by disturbance of the digestion, for the same nerves supply both lungs and stomach. Cough may also be produced voluntarily, as when we wish to "cough down" a tiresome speaker, or relieve the tedium of a monotonous address.

The tonsils, which lie on either side of the back part of the mouth, are apt to get large and prominent, so as sometimes to touch one another and interfere with breathing and swallowing; they have no nerves of common sensation, and hence may be the unrecognized cause of troublesome cough. The uvula too, which hangs from the back of the palate between the tonsils, may get so long as to tickle the back of the tongue, and cause violent and incessant coughing.

The larynx, or voice-box, forms a visible prominence in the neck, called "Adam's apple."

The opening to the voice-box and windpipe is closed by a flap or valve, which most of us must have noticed at the root of an ox tongue, as seen in a butcher's window or when served up to table. This gristly flap, called the "epiglottis," sometimes gets red and inflamed, and then produces a very annoying and characteristic cough; at times too it gets so swollen as almost to block up the narrow chink, "glottis," through which air passes to the windpipe and lungs.

We can feel the "windpipe" if our neck is thin, for it passes down just beneath the skin from the larynx into the chest, and divides when behind the breast bone into two branches, one for each lung.

The windpipe is quite separated from the "gullet," or "red lane," which runs behind it; and air can pass up and down the one while food is passing down the other.

In spite of the beautiful valvular arrangement to prevent such an accident, a crumb of bread or a few drops of fluid will sometimes "go the wrong way," i.e. enter the windpipe instead of the gullet; the consequence is a strangling sensation and fit of coughing, during which the fluid is ejected, the eyes water, and a minute or two elapses before we regain our accustomed composure.

Both windpipe and gullet are lined by a moist red membrane, continuous with, and similar to that which lines the mouth and nose — the uvula and tonsils. If from any cause the lining of the gullet is inflamed or irritated, that of the windpipe is apt to be affected also. We all know that when the stomach is deranged the tongue gets out of order too, for the mucous membrane which covers the tongue is continuous with — is indeed the same membrane as — that which lines the stomach; so that when we look at the surface of the tongue we learn something about the surface of the stomach.

A German philosopher recently invented an electric lamp which, when swallowed, illuminates the stomach as brightly as the sun illumines the protruded tongue; but as it is easier for the patient to put out the tongue than to swallow the lamp, and for the doctor

to look into the mouth than into the stomach, the practical value of this ingenious invention may well be doubted.

Just as the tongue is red or coated when the stomach is, so the epiglottis, uvula, and tonsils are similarly altered. The unnatural state of these parts gives rise to a sense of irritation; an attempt is made to remove this by "hawking," "clearing up," or coughing. Such, then, being the rationale of "stomach cough," it is evident how useless it would be to attempt to remove it by employing remedies which act only on the lungs. Cough arising from flatulence may often be relieved by ginger and sal-volatile, or better by the avoidance of hot tea, too frequent meals, and other things that engender the evil.

We sometimes hear of "ear cough," or cough due to irritation in the tube that connects the internal with the external ear: treatment must in this case be directed to the part affected, and not to the stomach or the lungs. These spongy organs, together with the heart, fill the chest. The lungs consist of elastic tissue, and are enclosed in an investing membrane called the "pleura," which also lines the inner side of the ribs.

The windpipe divides, as we have said, into a right and left branch, or "bronchus," and each of these again subdivide, forming a number of branching channels, "bronchial tubes," which penetrate to the farthest recesses of the lungs.

Each little bronchial tube ends in, or communicates with, several little sacs, for the object of the tube is to carry air to the blood-vessels which cover the lung sacs. The fresh air parts with its oxygen, and brings back carbonic acid, while the blood gets rid of its carbonic acid and receives instead vivifying oxygen, changing meanwhile in color from blue to red. If either the air or the blood is impure, respiration is imperfect and health is lost. Cough, due to this kind of faulty respiration, is often a valuable guide to the detection of the true evil.

Beneath the mucous lining of the bronchial tubes is a layer of muscular and elastic tissue, which by its contraction expels the air and forcibly removes phlegm in the act of coughing. Minute waving cilia cover the membrane and sweep away — as by myriads of soft brooms — offending matters from the tubes. The surface of the membrane secretes a fluid called "mucous," like that which moistens the mouth and nose: this may be suppressed, and lead to dryness; or may be excessive, as it is in "catarrh," or "cold in the head."

"Bronchitis," or "cold in the chest," begins with undue dryness of membrane. The bronchial surfaces lacking their natural lubricant are easily irritated by the passage of cold, dry, or dusty air; the air is rapidly drawn in and expelled, gets beaten up with the sticky secretion, forms frothy phlegm, not unlike "soap-suds," and this frothy stuff becomes a further source of irritation and tickling cough. As the inflammatory stage of the affection passes off, the phlegm gets less tenacious and frothy, becomes yellow in color and smaller in quantity; but not until the excessive secretion ceases is it wise or safe to give remedies to stop the cough.

A sense of pain or oppression under the breast-bone is often complained of in bronchitis; the patient is so little conscious of the real seat of the affection, that he often refuses to believe that the malady extends farther than the root of the neck. For as there are no nerves of common sensation distributed to the lungs or bronchial tubes, the cough may be the only evidence of disease.

Bronchitis is but one of many causes of cough; and before prescribing for a cough, it is, as we have said, necessary to be satisfied as to its cause. Oftentimes cough is the earliest symptom of grave lung disease, and may be of immense value in directing attention to a malady at a time when it may be speedily removed, whereas in a more advanced condition it would not be amenable to treatment.

Medicine is defined to be the science and art of preventing, curing, and alleviating the diseases of the human body.

LEPROSY.

IN the south of Europe leprosy is still endemic, although to a very partial extent, in some points of the coast of North Italy and of the south-east of France. The only place on the east coast of Italy where it is known to exist is Comacchio, situated close to the notoriously unhealthy lagunes of Ferrara, and where the malady has been endemic for ages past. It is confined almost entirely to the town and its immediate neighborhood, and happily it has of late years diminished in frequency, so that the total number of lepers now in Comacchio is believed not to exceed a dozen or so at most. Along the coast of the Gulf of Genoa, from Chiavari to the frontiers of France, it appears to be somewhat more common in certain spots, as at Chiari and Varazze in the district of Genoa, but specially in the province of Nice, as at Monaco, Pigna, Castelfranco, Turbie, etc. In the official report made in 1843, the number of leprous persons in the Sardinian states is stated not to exceed one hundred in all; but, if this statement were then correct, the malady would seem to have become more frequent since; as, in 1858, the Government found it necessary to convert a monastery at St. Remo into a lazar-house, into which forty patients from the surrounding district alone were at once admitted. The disease appears to be confined to the poor population of the coast. At some points of the French coast, too, along the shores of the Mediterranean, in Provence, Languedoc, and Roussillon, it is still met with. Formerly, it was extremely common there; and even down to the latter half of last century, it existed to a considerable extent in some districts. The Delta of the Rhone, especially about Martiguez * and Vitrolles, also Berre, Rognes, and other places near Marseilles and Toulon, were the localities which were most affected, and where scattered cases have continued to be observed during the present century. Throughout last century, even down to its close, the disease was by no means uncommon also in Auvergne, about the district of the Mont d'Or, under the name of the "Mal S. Main." In the course of the present century, it seems to have entirely disappeared from this part of France, as it had previously done from other parts of the country, as for example, from the coast of Brittany and Normandy, where it formerly prevailed to a considerable extent.*

Spain continues to be more infested with leprosy than most other European countries; but our information as to the extent of its prevalence in different parts is very scanty and imperfect. In the latter part of last century it was common in Andalusia, Asturias, Galicia, etc.; there were many lazar-houses in these provinces at that time, occupied by numbers of inmates. It still exists to a considerable extent not only in these parts of the peninsula, but also in Grenada,† and in Catalonia.

*There are two very interesting papers on the leprosy at Martiguez, on the coast of Provence, and not far from Marseilles, in the Memoirs of the Royal Society of Medicine in France, for 1779 and 1787, by Dr. Vidal, a resident physician there. These papers were followed by "*Recherches sur état actuel de la Lèpre en Europe, etc.," par MM. Chansereu et Coquereau,* in Vol. V. of the same work.

* The introduction of the disease into New Brunswick has been attributed, as will have been seen from the documentary evidence in the Report, to emigrants from St. Malo during the present century.

† "The Leper Hospital at Grenada, founded by Queen Isabella, contained (in 1859) 53 inmates, 39 males and 14 females. Their ages varied from 14 to the grand climacteric. In a few of the inmates, the only symptoms were small dark eruptions on the skin; but in the majority there were tubercular elevations and excrescences on the face, forehead, nose, ears, and frequently also on the neck, arms, and hands. In the advanced cases, the features were much deformed by swelling and ulceration, the mouth and tongue were ulcerated, the voice was low and husky, and occasionally one of the eyes was lost. Several had lost fingers, toes, and even a hand; and in two cases the whole body was one mass of corruption.

"Almost all the patients, it is stated, were inhabitants of the sea coast in the south-eastern provinces of the country, especially in Almeria, Adra, Motril, Malaga, Velez-Malaga, or of Cadiz and its vicinity.

"Senor Mendez Alveiro recently stated to the Royal Acadamy of Medicine, at Madrid, that, in 1851, there were ascertained to be 284 lepers in nine provinces of Spain, without reckoning many more about whom no statistical return had been obtained from the districts where they resided. It has been asserted by some writers that the disease has increased since the beginning of the present century. Of the above 284 patients, 188 were males and 96 females. Their ages varied from 15 years to 45; three-fourths of the whole were persons of middle

Dr. Grasset, writing in 1820, mentions particularly in the last-named province the towns of Reus, Rindoms, Vilaseca, and the mountainous district of Prades, near Tarragona, as localities where many leprous cases were to be seen.

In Portugal, the chief seat of the disease in recent times has been the hilly district of Lafoes, in which the number of leprous persons was, about thirty years ago, variously estimated at 300 to as many thousands. It is still endemic also in the provinces of Lower Beira and the Algarve. There is a leper hospital in Lisbon. Forty or fifty years ago, the number of inmates was said to be about forty; since that time, the usual number appears to have been larger. When visited by Dr. Webster, in 1861, it contained sixty-nine patients: forty-nine males and twenty females.* The disease is known in Portugal, and in the Brazils, under the name of "Morfea," or of "Mal de San Lazaro."

With respect to the other countries of Europe, hitherto not mentioned, viz., Great Britain, the Netherlands, Denmark, Germany, and Switzerland, cases of the disease have, during the present century, been of very rare occurrence among the native residents. Most of the examples that have been met with in England (and the remark applies, we believe, to Holland also,) have occurred in persons who either were natives of some of the tropical countries where the malady is still common, as in the West or East Indies, etc., or who had resided there for many years.

Before passing over from the old to the new world, it is to be noted that leprosy continues to exist in several of the islands off the western coast of Africa. It is still endemic in Madeira, although not now to the extent that it was at the end of last century. There is a leper hospital near Funchal. The number admitted between 1702 and 1803, according to Dr. Adams, in his work on morbid poisons, was 890, of whom 526 were males and 373 females. In 1829, Dr. Kinnis found 17 males and 7 females in the establishment, affected with tubercular or articular leprosy, in various degrees of severity. To what extent it exists in the Canary and Cape de Verde Islands has not been ascertained. Cases have been met with in St. Helena, and the disease is still seen in the Azores.

In the new world, the countries which appear to be chiefly affected are Mexico, and other parts of Central America, Brazil, and several of the West India Islands. In Mexico it has been long known; it occurs chiefly among the Indian tribes, not only near the coast and in the low plains, but also in many elevated plateaus, a thousand feet and more above the sea-level. It is common also in New Grenada, Venezuela, and Ecuador. Ulloa mentions its prevalence in and around Carthagena; and, in a memorial addressed to the first congress of the Republic of Colombia, in 1823, the towns of Bogota, Tunja, Casanare, Socorro, Pampluna, etc., are enumerated as being infested with it. Throughout the whole extent of Guiana — Dutch, French, and British — it is common, and is often known there under the names of "mal-rouge," "coco-be," or "boasie." In 1786, a French royal commission reported on it as it prevailed in the colony of Cayenne, where it was popularly called "Le mal rouge." Forty years later, the number of inmates in the leper-house in the town of that name averaged sixty; but this number was only a small proportion of the lepers in the province. It has been recently stated that the malady has decidedly increased, of late years, in Dutch Guiana or Surinam.

It is exceedingly prevalent in different parts of the Brazilian empire, and especially in the inland provinces of

age. 79 had been affected with the disease, at the time they were officially enumerated, from one to five years, and 122 from five to ten years. The remainder had been afflicted for much longer periods.

"Both here (Grenada) and elsewhere it is confidently stated that the ordinary attendants at leper houses rarely, if ever, manifest any symptoms of the disease, notwithstanding they have long resided in such establishments; and leprous patients may remain at home for years, without infecting any other member of their family." — *Dr. Webster in the Transactions of the R. Med. Chirurg. Society*, vol. 43.

*Dr. Webster informs me that these inmates "were laboring under various forms of leprosy, but none appeared examples of pure Arabian elephantiasis; that variety being of rare occurrence throughout this district of Europe."

Matto Grosso and Minas Geraes, and in the maritime district of S. Paolo. In some places, almost every family is said to be tainted with the "morfea." The Governor of S. Paolo, in his report for 1840, remarked: — "It is indeed a sad spectacle, on the road from Rio de Janeiro to this town, to meet such numbers of persons infected with the leprosy. In the neighborhood of every village in the district, we find a hut or shed which serves as a refuge for these unfortunates, who are excluded from all society." Notwithstanding the wide prevalence of the disease throughout the entire kingdom,* there are only three leper hospitals in Brazil, viz., one at Rio de Janeiro, one at Bahia, and one at Pernambuco.

In the La Plata states, the disease is said to be little known, and only seen in the provinces of Parana and Uraguay, in the interior. In the countries on the west side of South America, as in Chili and Peru, it seems to have been scarcely, if at all, observed, until quite recently. Cases have been met with of late years in the city of Quito.

With respect to the West Indies, the prevalence of leprosy seems to vary a good deal in different islands; for while the disease is common in Cuba, Jamaica, Barbadoes, Guadeloupe,* and St. Bartholomew, it is alleged to be of rare occurrence in Porto Rico, Martinique, and St. Lucie.

The only parts of North America, to the north of Mexico, where the disease has been met with, are one or two districts in the province of New Brunswick, Greenland, and the Aleutian Islands in the Sea of Kamschatka, between the continents of Asia and America.

*Mr. Bates, in his recent work "The Naturalist on the Amazons, 1863," mentions the great frequency of leprosy in some parts in the interior, especially at Santarem, situated at the junction of the Tapajos with the Amazon, and which is known as the "cidade dos lazaros." Some of the best families in the place are tainted with the disease; it falls on all races alike, white, Indian, and negro, but he never heard of a well authenticated case in a European. The staple food of all classes in most parts of the Lower Amazon country is salted fish.

*Dr. Adam Neale quotes, from the 50th vol. of the "Philos. Transactions," the Report of a Commission appointed by the French Government, in 1748, to inquire into the prevalence of the disease in Guadeloupe, where it had first attracted notice about 25 or 30 years before. The Commissioners examined 256 suspected persons; of this number, 125 (22 whites, 6 mulattos, and 97 negroes) were affected with the developed disease. As many of the patients resided on elevated situations as in the low marshy plains. The prevalent belief was that the disease had been introduced into the island by negroes brought from Africa, with the disease already upon them when they arrived.

"CATCHING COLD," OR "CATCHING HEAT"?

BY ROBERT WHITE, JR., M.D., BOSTON.

THE season during which the complaints commonly called "colds" prevail most extensively is now upon us, and their very general prevalence at this season, may justly entitle them to be called fashionable, for there are fashions in disease and in medicine as well as in other things. Of course their being fashionable will prevent a large number from taking precautions against contracting them, yet, as they are troublesome, at least, and by inattention and ignorance may become dangerous, and as it is easier to avoid them than to get rid of them, we will try to explain how colds are contracted, and what they are. There is a general misapprehension of the true nature of these affections, and of their causes, the very phrases cold and catching cold being often misnomers, and we propose to show that in many cases the trouble is caused by catching *heat* rather than catching cold.

The parts usually affected by colds, are the lining membranes of the nose, throat and lungs, or, more properly, of the bronchial tubes; for when the lung substance is attacked, the affection is of a very different and more severe character than a common cold. Every time we breathe, the air which we draw into our lungs passes through the nose, throat, bronchial tubes, and finally into the air-cells of the lungs. These are all covered with a thin delicate membrane similar to that on the inside of the lips, plentifully supplied with blood-

vessels, and with innumerable little follicles, that secrete a milky fluid called *mucus*, for the purpose of keeping the membrane in a moist and healthy condition. The mucous membrane of the nose, mouth, and throat, is constantly covered with this mucus, yet, when the secreting surface is in a healthy condition, its presence in the air-passages gives us no trouble; it is only when affected by cold, or some other exciting cause, that we know anything of this secretion, and then its presence in increased quantity in the nose is manifested by the necessity for the free use of the handkerchief, and in the throat and bronchial tubes, by "hawking" and coughing, produced by the irritating presence of the *mucus*. These are the most common symptoms of colds, and we will not enumerate any others, as these are the only ones to be considered in connection with the subject we wish to speak of at present, viz., that these pulmonary complaints may be contracted by exposure to heat, as well as to cold. Every one knows that in going from a hot room to a cold one, or to the outside air in cold weather, they are liable to get cold, but very few know that they incur the same danger in going from a cold atmosphere into a warmer one. It is but a short time since this theory was first advanced, and it has not received the attention its importance would warrant, for nobody likes to trouble himself about a slight cold, lest he should be thought "fussy," etc., but it should be remembered that these affections do not always remain slight colds, and that what is apparently but a trifling attack may become a prolonged and serious one, and have a dangerous or even fatal termination; so, for the benefit of those who are particularly susceptible to colds, and desire to avoid them, we will try to show how they may be contracted by heat.

As before stated, the mucous membrane of the air-passages are the parts affected in colds, and are supplied freely with blood-vessels and mucous follicles, which in health pour out sufficient *mucus* to keep the membrane moist and healthy; when a cold is contracted, the increase of this mucus is one of the most prominent symptoms, and is caused in this way: you probably know that when cold is applied to the skin in any way it drives the blood from it by constricting the vessels, and that as soon as the column of blood regains its force, the fluid returns to the skin in increased quantity; this fact is well illustrated by plunging the hand into hot water after it has been benumbed with cold; the redness of the skin, and the painful tingling produced, give pretty good evidence of the force with which the blood returns. Now this is just what happens in the mucous membrane of the air-passages; the cold air, passing over the membrane, drives the blood from it temporarily, but when it returns it comes with greater force and in larger quantity than is natural, distending the blood-vessels, and forcing a greater amount of the fluid to the mucous surface, exciting them to increased activity, and they then pour out a larger amount of the mucous secretion than is discharged in health, in order to relieve the congested state of the mucous membrane. Suppose a case, to illustrate this point. A man leaves the office, or work-room, where he has been breathing an atmosphere of 70 to 80 degrees Fah., plunges at once into the cold outside air of 10 to 20 degrees Fah., and after an exposure to this of half an hour, more or less, reaches his home, and at once encounters as great a change again, passing suddenly from an atmosphere approaching zero to one seventy or eighty degrees above it. Of course these sudden transitions from one extreme of temperature to another affects the mucous membrane, which is exposed to the air very unfavorably, and the different alternations of cold and heat to which it is subjected produce their characteristic results, ending in the congestion and increased secretion of the mucous surfaces. Now, as you have some idea of the cause of colds, and as knowledge is power, you can take measures to avoid them, for "an ounce of prevention is better than a pound of cure," and it is much easier

to avoid a cold than to get rid of one. How can we avoid them, you ask, if both cold and heat give us colds; we cannot reduce the temperature of our rooms below a comfortable degree, nor elevate that of the outside air; very true; but you *can* very often avoid going immediately from a cold room into a hot one, and *vice versa*. After coming in from very cold outside air, linger for a minute or two in the hall, or on the staircase, before entering the heated rooms — which, by the way, are much too hot generally — and on leaving the house observe the same rule. Many will consider these needless precautions, useless trouble, etc., but some people are exceedingly susceptible to colds without knowing why they contract them, when, as they suppose, they have not been exposed to any exciting cause, and it is to those who are so exceedingly susceptible that these precautions are particularly recommended; at first, perhaps their observance will be a little troublesome, but after following them for a short time, and experiencing their benefit, those who have been sufferers from almost continuous colds during the winter season, will feel well repaid for their attention, by the unusual freedom from these troublesome complaints which they will experience.

A LEGION OF LEECHES. — Seventy-four thousand doctors! Think of it. All this number in our country, according to the present census, unless the newspapers inform us falsely. In 1860 there were fifty-five thousand,— an increase of 19,000 in ten years, or nearly two thousand a year!

Ought not these figures to "give us pause?" Reflect a moment what an army they would make, even in this day of big armies; or what a city they would form, larger than any in many of the oldest States.

Or, look at it again from another point of view. What a mint of money it takes to support this army! Probably we are within the mark when we calculate that the average income of the 74,000 from practice is a thousand dollars a year each. This makes $74,000,000 a year, which the sick pay for medical advice. For their medicines it is safe to say they pay the odd $26,000,000 which remains to make up $100,000,000 a year, as what sickness costs the American people. And in this calculation we have left altogether out of account the tons and hogsheads of quack medicines which this misguided people pour down their throats. We can safely estimate that at $25,000,000 a year more.

Let the people study these figures awhile, and then reflect that probably one-half, or certainly a large fraction of this expense, is incurred by a deliberate infraction of the laws of health; that if they tippled less, smoked less, over-worked less, were less given to lechery and wantonness, ate slower, exercised more judiciously, were less "fast," and less self-indulgent, they would save some thirty or forty millions a year.

Making money is in America the "chief end of man;" and plenty of advisers are ready with their wise saws how it can be accomplished. We are one of them, and offer a saw quite as true and less trite than any of them, and it is this — keep healthy. Living in the midst of a commercial mart, and in the thick of the desperate conflict for wealth, we have seen many a hero in the fight lose all for want of health; lose it, perhaps, just at the moment when a month or two more of work would have made a fortune.

It is said that when Alexander VI. died, his son, the famous Cæsar Borgia, had every provision made to seize the supreme power and make himself master of Italy, that he had every possible contingency guarded, but one, and that was his own physical inability to take advantage of the crisis. But sickened to threatening illness, by the same poisoned wine which killed his father, he lost his chance and died defeated, an exile and a captive. It were well if many an American business man took warning by the moral this fragment of history conveys, and would remember that the labor of a life may be lost by the preventable illness of a week.

Medical and Surgical Reporter.

CONSUMPTION.

BY CARL BOTH.

HISTORY. — TREATMENT.

HAVING given, in brief, the historic and general view of Consumption, we pause to take note of the varied treatment employed for its amelioration and cure. If we have found that during the past, great confusion of ideas relative to the origin, nature, and character of consumption have existed, it will not be surprising if we find a similar confusion in reference to its treatment, which necessarily changed with every change of view relative to the disease. The treatment of Hippocrates, Galen, and all the old physicians, was similar to that of ulcers in other parts of the body. They sought to dry up these ulcers by means of inhalations of different things, such as tar, myrrh, etc.; to delay the cough by the use of narcotic herbs; and at last, by sending their patients to dry places. They were also acquainted with the use of surgical instruments in certain forms of pleurisy, etc., from all of which we draw the inference, that patients under their treatment fared, to say the least, no worse than those of the present day.

The old Greek and Roman physicians, for the most part, used vegetable compounds as internal remedies; though occasionally they employed minerals, (gold, antimony, and arsenic, the use of which was learned from the Arabian physicians,) to some of which they ascribed the most wonderful properties; but, in general, minerals were only employed as charms. The treatment and remedies of Galen covered a period of about 1500 years, or nearly to the present century. Every writer upon therapeutics during this period, it is true, had made an attempt to add something to it, but by far the greater part was what Galen himself had written.

During the mystical period, the monks were the principal possessors of knowledge, and an ordinary physician probably knew less than a good modern nurse. The monks, however, were in possession of secret remedies, and proprietors of the philosopher's stone, etc., of their times. About A.D. 1520, Paracelsus appeared upon the stage of medical history, and was successful in demolishing many of the old ideas and doctrines, and of introducing opium in combination with minerals — especially antimony and mercury — into practice. His success in the healing art, which was mostly performed in the open market-place, roused the jealousy of his contemporaries to a high degree, who pronounced him a quack and an impostor, though very soon imitating whatever they could learn from him.

In connection with the ulcer theory, antimony, lead, and opium kept the field; not, however, to the entire exclusion of vegetable preparations. Lung-wort (Pulmonaria Officinalis), Hoarhound (Marrubium Vulgare), Yarrow (Achillea Millefolium), and many other herbs of similar character, as also those which possessed narcotic properties, among which were the following: — Cowbane (Cicuta Virosa), Poison Hemlock (Conium Maculatum),

Lactucarium (Lactura Virosa), Fox-glove (Digitalis Purpurea), Stramonium (Datura Stramonium), Deadly Night-shade (Atropa Belladonna), Henbane (Hyoscyamus Niger), etc., with a great variety of roots, mosses, and barks, being used to a considerable extent. The executioners of those times were also very famous on account of the secret remedies they were supposed to possess, some of which were arsenic, antimony, the blood of persons who had been executed, etc. At one time, the white excrement of dogs, containing lime, was a remarkable and most famous remedy, among high and low, rich and poor; and even within a few years, the writer has seen peasants use it. The fat of dogs, cats (especially wild ones), foxes, and of other animals, has had many advocates and admirers. Snake oil, spiders, snails, and different kinds of bugs, have been freely used, but for most part without the knowledge of the patient; the remedies being given on or between pieces of bread. External manipulations have also been more or less prominent among the remedies employed. Plasters, setons, and ointments, were in vogue. Artificial ulcers were made upon the arm to relieve the lungs. Mineral springs were resorted to during all the past, as at the present time. It is, however, next to impossible to define which or what remedies were mostly or more especially employed at any one period, the practice being not altogether unlike that of the present. Particular remedies became fashionable in certain locations, from the fact that some particular crowned head, prince, or renowned character, had used it, or because it was believed that some particular personage had derived benefit from it. It was in this way that Peruvian Bark gained a great reputation in consumption. Louis XIV. bought it as a secret remedy, for which he paid 2,000 Louis d'or (about $9,680), and therefore it must be good. As long as the ulcer theory continued to predominate, it was known that consumption (the ulcers) would heal under certain circumstances, and whenever this occurred under the employment of any given remedy, this, of course, was the one.

During a more recent period, when the *specific principle* theory of Consumption was in the ascendant, it was natural that a *specific remedy* should be sought for. At one time mercury was everywhere the most prominent remedy, it being thought that it possessed the power of destroying the *specific principle*, but in the end was found to be bad. Another of the specific remedies, was what was known as the "emetic cure." It was thought that the specific principle of the disease (noxa) could in some way be induced to leave the lungs and be ejected through the operation of the emetic. Antimony, arsenic, lead, gold, silver, and other minerals, especially iron (when it became known that this metal formed a constituent of the body), have played a conspicuous part in the specific cure treatment. At one time, prussic acid gained a high reputation as a specific, though opium maintained the first position, either by itself or in connection with sugar of lead. New remedies were in constant demand to satisfy the failing patient, who, like a drowning man, was ready to catch at anything. Sulphur and sulphur baths were recommended

by one; creosote, or gums and resins, by another; and chloride of ammonium, with sea bathing, or sea-salt bath, etc., by another, and so on, *ad infinitum*. The great Hahnemannian *specific* remedy is the *pus* of animals suffering from horse glanders (Rotz-gift), in very high dilutions. Others recommended the poison of bees, and of venomous snakes, as the better antidote. In connection with a very strong faith and a lively imagination, it is not improbable that some of these remedies may have proved useful to the patient. The effectiveness of this class of specifics, however, would doubtless have been better appreciated, had they for a basis something better to rest upon than such very highly diluted infinitesimal quantities of anatomy, physiology, physics, chemistry, and pathology, that it would be impossible to detect them.

After the discovery of iodine it was thought that no remedy could be made to supercede it; but, like all previous specifics, it failed to meet the expectations of its advocates. In the meantime the views of Lænnec became predominant, and the conviction more or less established, that the disease was absolutely incurable. This view, however, was very strongly opposed by Broussais, who, by bleeding, thought he could extract the diseased blood, and, by creating new, save the patient; but his failures in practice only served to fortify the views of his opponents.

As the result of these opposing views relative to the curability of Consumption, greater attention was paid to the present comfort of the patient, by seeking to relieve the more urgent symptoms, and, when practicable, by sending them to different places for change of air, diet, scenery, etc., in accordance with the wishes or caprice of the patient, or the prevalent practice of the time. At one time, it was the sea, at another, Italy, then Egypt, and then to Greenland, because Consumption was not found there; then, again, to the south of France. They were also sent to coal mines, because the workmen were very seldom troubled with Consumption; and one man started the idea that living in stables was beneficial, because persons employed in them were free from this disease. Stables having extra accommodation, were therefore built for this purpose, but continued to be used only for a very short period.

The discovery of iodine in cod-liver oil by a chemist, led to its very general use some thirty years since in Germany. It was introduced into England by Bennet, and highly recommended by Williams, of London; and very soon became almost universally used as a remedy in this country. Its high reputation was not altogether due to imagination, as may be seen from the following. The poorer classes of Europe very seldom, if ever, ate the flesh or fat of animals, being unable to procure them. Their principal diet was composed of potatoes and rape-oil; an unwholesome vegetable oil, used principally for burning purposes. When such half-starved persons went to the dispensaries, and were treated with cod-liver oil, it was found that they immediately began to improve, and to gain in flesh and weight; and hence the prevalent idea of its curative qualities and extensive employment; but good beefsteak, with

plenty of bread and good butter, would have produced similar, if not better results.

The demonstrations of Liebig relative to life—that it was a burning process through oxygen, and in reference to which Henle jokingly remarked, "if so, then we should be able to sustain latent life in the body by the exclusion of oxygen, as in grain by the exclusion of moisture"—led to the extensive use of fusel oil, which obtained a great reputation in England and in this country. A speculative Englishman, from the demonstrations of Liebig and the hint contained in the playful remark of Henle, concluded that if some remedy were employed which contained no oxygen, the wasting or burning away of consumptive lungs might be arrested; and as fusel oil contained very little oxygen, the formula of which as used is $C^{10} H^{10} + 2 H O$, he experimented with it, and published a pamphlet on the subject. In this way fusel oil came into use, and was largely prescribed for consumptives, very much to the disadvantage, however, of the digestion of the victims. Fusel oil may be recognized as one of the ingredients of vile liquors which makes people sick when they drink them.

In this connection we may here mention the use of alcohol as a remedy; it being still recommended by many physicians at home and abroad. It is one of the remnants of Brown's theories of diseases (based upon Galen), and of their treatment,—that want of force should be treated by stimulants. On this subject Dr. Anstie, of London, has the following: "The question of alcohol in phthisis of adults is hotly disputed; on the one hand, many authorities maintain that it is an unmixed evil; on the other hand, the treatment possesses numerous advocates, and we even meet with records (by Flint and others) of patients almost exclusively nourished upon an alcoholic diet for prolonged periods, with apparently beneficial effect." "This subject has engaged our particular attention, and without expressing a very confident opinion, we have good grounds for believing that the following is a near approach to the truth." "There are two classes of cases in which alcohol appears to play an important part in the arrest of phthisis." "In a class of patients who have delicate skins and perspire very freely, and with whom, at the same time, oil and fatty matters habitually disagree (a not very common combination of conditions, but one which is seen in a certain number of instances), we have more than once seen remarkable effects produced by the entire abandonment of all medication and the employment of large doses of spirit—whiskey or rum; and a singular point in these cases was the *tolerance* of alcohol that was shown, even from the first." . . . . "Our own experience has led us to believe that the question must be judged just as we have proposed that it should be judged in cases of acute disease,—*experimentally*." "In each case the effects of experimental doses upon the form of the pulse-wave, and on the temperature, and the elimination of alcohol by the kidneys, should be carefully tested; and according to what we have noted, in observing a large number of cases, we are justified in believing that when alcohol reduces temperature, and

the dicrotions of the pulse, and fails to pass away in notable quantity by the kidney, it *always does good;* but that the slightest degree of narcotic action of alcohol is harmful."

Our own opinion, however, of the action of alcohol in Pulmonary Consumption, and in cases that are mistaken as such, is: that nothing brings the patient more quickly and surely to the grave, especially if taken during the period of tuberculous formations;— that by its fat accumulations it excludes minerals from the blood which are really the only hope of cure, and makes the death of the patient one of restless torture, when by other treatment he might have recovered; or, if otherwise, come to his death like a person falling asleep, without struggling and tortuous suffocation.

We conceive that alcohol helps a consumptive person much in the same way as it helps a man failing in business, mind, or capacity. That it makes the patient *feel* better, in the meantime, while under the influence of the alcohol, we will not deny; but his feeling better and being better are two very distinct things.

The old Greek treatment of inhalations was revived again in Germany about twenty-five years ago. At first, chloride of ammonium was used; afterwards, narcotics were employed, from which the smoking of stramonium cigars had its origin. It was not long before other vapors were employed, and this treatment, in different variations, came to be employed by many physicians. To inhale finely dispersed liquids, holding medicine in solution, is one of the latest modifications of this treatment. There can be no doubt that many suffering from chronic bronchitis have been benefited and temporarily relieved by this method of treatment; and more especially is this the case in asthmatic affections, its effects being often immediate.

What was known as the cold water treatment of consumptives has also been somewhat extensively employed, but always with serious injury to the patient. To visit these cold water institutions and witness the chattering of teeth, the blue lips and nails of the poor fellows under treatment, was enough to call forth the pity and commiseration of a stone. The grape-cure has been employed with great benefit to many sufferers, by rectifying their digestion, and, with this object in view, is still recommended by the best physicians in Europe. But the milk-cure has proved even more beneficial, especially to the wealthy, whose means have permitted them to visit Switzerland, the Pyrenees, Sicily, or Peru, and to enjoy the best milk in connection with the pure mountain air. That most consumptives will feel better under these changed conditions of air, scenery, etc., than at home, shut up in a sick-room, especially for the first few months, it is not at all difficult to comprehend; while there are many cases of chronic bronchitis and catarrh which are in this way really cured.

The extract of malt, of meat, and the juice of various herbs, alone or in combination with other remedies, have been most thoroughly employed, with at least no disadvantage to most patients. The decoctions of mosses containing gelatine have also been em-

ployed in all periods. In Germany, it has been highly recommended that consumptives live in pine woods, that they may inhale the balsamic odor emitted by the trees. But the greatest expectations were raised, based upon increased and decreased atmospheric pressure, by means of bells and an air-pump. Patients were put under a glass bell, and the atmospheric pressure increased, with a view to promote the healing of the lungs. Again, the patient was secured in a bell up to the neck, and the atmospheric pressure withdrawn, by pumping out the air, and by thus causing a congestion of the skin, it was thought to draw the inflammation from the lungs; but both these manipulations proved to be injurious, in a very high degree, to consumptives.

Phosphorus, in various forms, has, of late, been freely used, it being thought that phosphorus formed one of the predominant elements of animal life; but the results obtained have fared no better than those of other specifics. The best and most thoroughly educated physicians of the present, do not employ specific medicines. They endeavor to sustain their patients by appropriate nourishment, and to relieve as much as possible from the annoyance and discomfort arising from particular symptoms. For excessive coughing, expectorants, soothing balsams, antimonial preparations, narcotics, etc., are employed. Sleeplessness is overcome by morphine and other hypnotics; night-sweats by mineral acids and quinine, or other tonics; sore throat by inhalations, cauterizations, etc., etc. Consumptive patients are also sent to milder climates to spend the winter months: in Europe, they are sent to Africa or Madeira; in America, to Florida, Mexico, Chili, Peru, California, and other places, and occasionally to curative institutions which have been established in Germany, Sweden, and France. It has been proved by experience in England, that the establishment of hospitals for consumptives is not advisable.

In reference to the effect of climate: the influence of the soil, whether composed chiefly of sand, clay, loam, or an alluvial deposit, damp or dry, and in connection with its cultivation; of the atmosphere, rare, dense, moist, saline, or otherwise; of temperature, mild and even or extreme and variable; of occupation, in or out door, mental or physical, sedentary or active; of the sea; of lakes; of rivers; of swamps; of winds; of electrical currents; of increased and decreased pressure, etc., the most thorough and searching investigations have been made, and statistics obtained with a view of ascertaining the cause and cure of Consumption. And in this connection we may here state, that probably no man living has made his name more widely known, or labored more earnestly and indefatigably in this direction, than Dr. Henry I. Bowditch.

Sea air was regarded by Lænnec as an antidote or preventive, while on the other hand Rochard proved, by statistics, that the mortality from Consumption was greater among the marine than among the land troops. Winteritz, however, was able to show that sailors were comparatively free from it. Bochardat arrived at the following conclusions: That persons suffering from diabetes always exhibit

tuberculosis; that cows kept upon food containing sugar, and deprived of free exercise in the open air, die of it; that monkeys, and even negroes die of it, when carried north; that indolence was one of its causes, which he endeavored to prove by citing cases of creoles and of nuns, who were accustomed to work hard, as outliving the indolent and inactive. He also cited in proof of his position cases of prisoners who were deprived of their usual exercise. He concluded from these facts, that lack of warmth was a productive cause of the disease. The fact, however, that this disease is unknown to the Esquimaux and inhabitants of the Hudson Bay, militates against this conclusion. It was ascertained by R. Foerster that children never exhibit tuberculosis under five years of age, with an occasional exception at the age of two, and not usually before the age of puberty. From statistics it has been shown by Lewin that the mortality among stone-masons, cotton-workers, porcelain-workers, and all such as are habitually exposed to dust, is greater from pneumonia and bronchitis than from tuberculosis. Pritchard, who lived about twenty years on the South Sea Islands, writes as follows: "Nothing kills the Indians so surely as coats, pants, and blankets; the pantaloon-wearing South Sea Islander catches cold and dies of consumption, a disease previously unknown to them." In 1860, a settlement was founded by the English on Vancouver's Island, which then belonged to a class of Indians who lived upon fish, wild berries, and roots, with an occasional change of wild game, and whose health had always been good. The English gave these Indians, in exchange for their land, flour, rice, syrup, potatoes, meat, blankets, clothing, and other luxuries. As the result of these changes in their modes of life, they very soon began to sicken, and two years later were destroyed in large numbers by tubercular consumption. In 1865, prisoners were taken by the English, in the Gulf of Bengal, transported to the opposite coast, and treated with the utmost kindness. They were provided with luxuries previously unknown to them, but very soon gave unmistakable signs of tuberculosis, of which large numbers of them perished, and the survivors saved from a similar fate only by being sent back again.

It is generally known that sewing-girls, shoemakers, clerks, etc., who are very much confined in their occupations, are among the surest victims of Consumption; and that athletes, ballet-dancers, gymnasts, and persons similarly engaged, die of this disease often after they relinquish their business. In mountainous regions, tubercular Consumption is almost unknown; but bronchitis and pneumonia take its place. Within the last fifty years, the significant fact has been noticed by physicians, that a disease of the right heart, which prevents the free flow of the blood to the lungs, is most generally complicated with tuberculosis, while the same disorder in the left heart absolutely excludes it. In other words, the comparatively small quantity of blood in the lungs in the first instance favors tuberculosis, while the comparative fulness of the lungs in the second instance positively prevents it. Another very peculiar fact that has been observed is, that tuberculosis is developed only in the upper points of the lungs, and never at the base of the lobes;

while all other affections most generally make their appearance at the base of the lobes, or where the lungs are mostly used, the upper points being comparatively free from attack in such cases. While these facts have been observed and noted, no one has been able to give a satisfactory reason for them.

As to the contagiousness of Consumption, opinions have varied very much: practitioners, in general, taking the affirmative side of the question. A few years since, Dr. Budd, of Bristol, England, in the London *Lancet*, advanced the idea that the contagion probably consisted of minute germs (spores), originating from the sputa expectorated by consumptives, which, floating in the atmosphere, were inhaled by others, and became productive of the disease. This germ theory of disease has had many advocates, and only very recently Prof. Tyndall made a series of experiments in this direction, an account of which was published; but the *conclusions* arrived at were not of a character to add much to the reputation he had previously gained. The fact is, that, in a great many cases, the observations which have been made, in connection with statistics, not only make the theory of contagiousness plausible, but seem to prove it; as to certainty, however, no evidence exists.

As previously stated, physicians at different periods avoided the study and practical use of anatomy, and, therefore, during the centuries that anatomy, as a science, had no existence, disease was regarded as an entity; a positive something inherited, or which walked about, travelled, or hid itself in clothing, etc., or leaped from one person to another; and hence the search for remedies against an enemy which appeared in different forms with different symptoms. As anatomy became developed, the name and form of this enemy was changed. At a very early period it was the devil, then it was contagion, miasma, inheritance, invisible spores, disease-germs, etc., etc.; but these having been swept away, the enemy (noxa) is now sought for in climate, air, etc. The triennial report of Prof. Dr. Richter, of Dresden, (one of the chief editors of Schmidt's *Jahrbuecher*, one of the first medical journals of Europe,) contains the most minute details of geographical, geological, climatological, atmospherical, etc., etc., statistics and reports, especially in reference to Consumption. But interesting as this report is in regard to general information, it is painful to observe its vagueness in reference to the miasmatical origin of disease, especially of Consumption. As an illustration of the truth of this statement, we quote the following: (See Schmidt's *Jahrbuecher*, 1870, No. 10, page 96.) "The discussion of Dr. Leopold Mueller and Prof. Hirsch, in the Berlin (Prussia) Medical Society, on the causes of the appearance of malarial fevers in dry and dampless localities, and their non-appearance in swampy regions, is very interesting." "In regard to the first, L. Mueller gives as cause — 1. The artificial irrigations, and, 2. Conduction of miasma by winds; for example, near Cape Haitien, in Haiti, the predominating north-east winds in the dry season conduct the fevers into the country seats, and compel the inhabitants to move into the city, where they had previously been

exposed to the same miasma by south and south-east winds." Having spent six months at the place referred to in the above extract, and being well acquainted with all the circumstances, as also with Dr. Mueller (who, if we mistake not, was chief surgeon to Geffrard, at the siege of Cape Haitien, 1865), we are able to give the *true key* to this dreadful miasma. The city of Cape Haitien, like all large cities, is situated near a river, with marshy banks at its mouth, but is separated from the swamps by the slope of a range of high mountains, the edge of which is called "le Haut du Cap"; a delightful spot, from which a beautiful view is obtained of the valley called "la Plaine du Nord." An especially dry season, such as is common in other places in Haiti, *e.g.*, Gonaives, is unknown at the Cap; while the average health of the city will not compare very unfavorably with that of cities in other parts of the world. There are fevers there, it is true, the same as in other parts of the tropics, ***and at all times and with all winds***, except in the direct vicinity of these swamps,—the plains, where an extraordinary degree of health exists.

The facts in the case are as follows: In 1865, Dr. Mueller was there with an army of six thousand men, half of which were stationed on the Haut du Cap, and the other half on the opposite side of the river, and directly opposite to the city. The road from Port au Prince leads over the Haut du Cap, and the provisions for the army had to pass over this road, the harbor being closed by the insurrectionists. During times of peace, the food of these soldiers consisted principally of rice, bananas, and a little salt fish, while now, it consisted principally of salt pork; bananas being too expensive, and not easily transported. No sooner has a Haitien changed his diet, as just described, than he gets "la fievre," no matter where he is. By eating ham and eggs myself, a fever chill could be produced in two hours by the watch; the effect of pork upon the Haitien soldier who was not accustomed to its use, but so fond of it as to fill himself to satiety, can therefore be very easily imagined. The miasma which the wind blew up there in 1865, and caused the fever, did not originate in the swamps, but was sent from Boston in pork barrels, containing a very inferior quality of swines' flesh. Such is the foundation upon which the discussion and statistics of Dr. Mueller rest in the case before us, and hence their vagueness and unsatisfactory character may be easily accounted for. It is true that impure air from the decomposition of organic matter is bad, but so is common gas, and, even more so, the carbonic acid which we exhale, but it does not follow that they constitute a miasma, which floats about in the air.

This seeming digression from our subject has been made on account of the claims set forth by the parties in question; but as we are unable to understand how, or in what way, reports like the one from which we have copied go to show the miasmatical origin of consumption, we leave it with our readers to determine. In relation to the inheritability of consumption, physicians in general affirm that, in their opinion, it is inherited in most cases; though men like Louis, Bochardat, Niemeyer, Virchow, and many others, have denied it, while

they admit the inheritability of a *tendency* only; but on this point nothing has been established, it being simply a matter of opinion and of varying observations.

The curability of consumption, under certain circumstances, was never doubted by the old authors; and only since the establishment of the *tuberculous specific principle theory* has a cure been considered impossible. Those physicians who accepted the theory of the inflammatory nature of consumption considered it curable, the others as incurable. The first class is represented by Hippocrates, Galen, with their followers, Meckel, Alison, Carswell, Broussais, Schoenlein, Virchow, Niemeyer, Bennett, and many others. The other class is represented principally by Morton, Bayle, Lænnec, and Louis (absolutely), Cannstadt, Clark, and Lebert, with their followers.

The physicians of Germany, and the greater part of the physicians of France, now *know* that consumption is sometimes curable by nature, while, on the other hand, there are few in England, with the exception of Bennett, and those who are influenced by him, who consider it curable under any circumstances whatever; a view which is all but universal in this country.

In concluding this sketch of the history of consumption, we take the liberty of presenting an extract from the preface of a treatise on consumption by Prof. I. H. Bennett, of Edinburgh:

"For five years the author held the position of pathologist to the Royal Infirmary of Edinburgh, during which period he performed and recorded the results of upwards of two thousand post-mortem examinations." "Gradually one great fact became impressed upon his mind, viz.: that all organic diseases occasionally presented a tendency to spontaneous cure." "He was repeatedly meeting with instances where, although death was occasioned by disease in one organ, there were others which presented traces of previously existing lesions, which in some way had healed." "In no organs were such appearances more common than in the lungs, *and of no disease was evidence of a spontaneous cure more frequent than of pulmonary phthisis*."

"Although it was generally considered by the profession that no remedy and no plan of treatment yet proposed could be depended on in cases of consumption, *it was obvious to the author, that if the process employed by nature could be discovered, and then imitated by art, we might ultimately arrive at the true principle of cure.*"

All who have studied medicine are, I believe, prepared to admit that the education of a medical man is never completed.

It is an accepted opinion, that no person can understand man in disease, who does not study man in health. Therefore the conditions of the body and mind in health are first studied in the sections,—anatomy, physiology, and animal chemistry.

All parts of the body are noticed to work independently, but all uniformly and correlatively. Every viscus and every tissue has its own specific actions, each cell its own life, and the sum of these make up the life of man.

THE DOCTOR. — He must be a man of the strictest honor and integrity, for to him are confided the secrets of families, the honor of wives and daughters — secret trusts that are committed to no other. Every medical man should feel the responsibility of these trusts, or he is unworthy of being a physician. The physician who practises his profession merely as a trade, for the amount of money that can be made by it, is unworthy of his calling. The higher and nobler motive of doing good to others, of relieving human suffering, of prolonging human life, is the only incentive that ever has or ever will make the great physician. In proportion to the weight of his responsibility should be the honor and the integrity of his character. How easy it is for the physician to control the destiny of his patients. On him they rest, and confide in his knowledge and truth. He decides for them questions of life and death. Happiness or unhappiness it is in his power to give, and why? The greater his knowledge the greater is his power. He has knowledge of how to do good, and consequently the power to do evil; and therefore the necessity of his being governed by the strictest honor and integrity in order to use that knowledge rightly.—*Prof. L. A. Sayre, New York.*

DYSPEPSIA. — The term does not apply properly to the transient rebellion of the stomach against abuse. A man is not a dyspeptic because he cannot play the glutton with impunity by an hour's industrious stuffing, or because he cannot sit till midnight taking in oysters and lager, and then carry the load home quietly.

SOIL AND DISEASE. — At a recent meeting of the British Association, in Liverpool, Dr. Moffatt, of Hawarden, read an interesting paper on "Geological Systems and Endemic Diseases," showing that the soil has an influence on the composition of the cereal plants grown upon it, and on the diseases to which the inhabitants are subject. The district in which he practises consists geologically of the carboniferous and new red sandstone or Cheshire sandstone systems. Anæmia, with goître, is prevalent amongst those living on the carboniferous systems, whilst it is almost unknown among those living on the new red sandstone system; and consumption is also more prevalent amongst the inhabitants of the former. Dr. Moffatt has found by analysis that the wheat grown on the soil of the Cheshire sandstone contains the largest quantity of ash, and that there is a larger quantity of phosphoric acid and of oxide of iron in it than in the soils of the carboniferous and millstone grit systems. He has calculated that each inhabitant on the Cheshire sandstone, if he consumes a pound of wheat daily, takes in nearly five grains per day of the sesquioxide of iron more than the inhabitants of the carboniferous systems, who seem, therefore, to be subject to anæmia in consequence of the deficiency of iron and phosphoric acid in his food.

NEURALGIA. — A correspondent of the *Lancet* says:— "A few years ago, when in China, I became acquainted with the fact of the natives when suffering with facial neuralgia using oil of peppermint, which they lightly applied to the seat of pain with a camel-hair pencil. Since then, in my own practice, I frequently employ this oil as a local anæsthetic, not only in neuralgia, but also in gout, with remarkably good results."

BLOOD STAINS. — The Spectroscope will reveal the presence of blood, which may be detected even if there is only one drop in a pint of water. The one-thousandth of a grain of blood gives the characteristic spectrum.

PRESCRIPTIONS NOT FOLLOWED. — "I am so glad to find you are better," said the famous surgeon, John Hunter, to Foote, the actor. "You followed my prescription, of course."

"Indeed I did not, doctor, for I should have broken my neck."

"Broken your neck!" exclaimed Hunter; "how is that?"

"Yes," said Foote, "for I threw your prescription out of a three-story window."

ANIMALS AS FELLOW-BOARDERS.

M. P. J. VON BENEDEN recently read a paper before the Belgian Academy on what he termed the *common-tableism* of animals, describing the habits of creatures who may be said to board together, but whose association is distinct from that of victim and parasite.

Every fish, he says, is a living and moving territory, on which a fauna is developed possessing special interest. When a small animal claims to profit by the fins of one larger than itself, accompanies it in its chase, and picks up spoils which the larger one disdains or abandons, we see none of the motives which characterize parasitism. Even when one resides upon the other, it frequently does not deserve the term which is applied to it. It is not rare to find loyal companions by the side of generous hosts, rendering service in return for the hospitality they receive. The parasite makes it his business to live at the expense of another; the associate is simply a table companion. When a whale is covered with barnacles, who can say that these Cirripeds are parasites? They merely ask of their colossal companion a lodging-place, and they are not more dependent upon him than coach travellers or railway passengers: they feed themselves on their journey. Leeches behave quite differently: temporarily attached to the skin of their host, they suck his blood, and drop off after their meal, that they may conveniently digest it. They are not deemed parasites, because they leave their host during the intervals between their meals; but this is an erroneous opinion, for they are true parasites, as the barnacles are true companions.

There are many animals living in common whose relation to each other is not well appreciated, and it will not be uninteresting to glance at these, and endeavor to form a notion of the ties that unite them. We do not mean to speak of those associations which are known as flocks and troops, composed of individuals of the same species united for defence or attack; or of different sexes, neuters, workers, soldiers, etc., which belong to the same family. Our purpose is with associations of different species whose members bring together their energy, their intelligence — I might say, their capital, and become fellow-boarders, living on terms of perfect equality; although it is not uncommon to see the strong use up the weak, or the evil-disposed slip in amongst peaceful communities.

Amongst fellow-boarders we see some that preserve all their independence, and who, at the least cause of discontent, break the connection, and seek their fortunes elsewhere. They are recognized by their apparatus for fishing and travelling, which they never put aside. Others instal themselves upon their neighbors, throw away all their travelling-gear, make themselves comfortable by a change of toilet, and renounce for ever their independent life. Their lot is fixed to the creature that carries them. They are permanent fellow-boarders.

Let us consider first—

FREE FELLOW-BOARDERS.

We find free fellow-boarders in different classes of the animal kingdom. Sometimes they sit on the back of a neighbor; sometimes they go in at his mouth, and follow the route of his food; and sometimes they take refuge under his cloak. An interesting instance belonging to this first category is afforded by the graceful fish, the *Donzella*, which makes its abode in the body of a *Holothuria*. The Donzella is elongated like an eel, and so compressed that it has been compared to a sword. It is found in different seas with pre-

cisely the same habits. The fish lodges in the digestive cavity of its companion, and, without regard for the hospitality it receives, takes its share of everything that enters. It makes use of a generous acquaintance, who can collect food better than itself. The *Holothuriæ*, or sea-cucumbers, are excellent fishers, and we often find in them, side by side with the Donzella, who are probably gluttons, prawns and pea-crabs, who come for their part of the spoil. My friend C. Semper has seen sea-cucumbers in the Philippines who were not bad imitations of an hotel furnished with a *table d'hôte*.

In the Indian seas a fish is found known as *Oxibeles lombricoides*, modestly lodged under a star-fish, and taking advantage of its fishing powers. In Brazil, a Siluroid, of the genus *Platystoma*, a clever fisherman, thanks to his numerous lines, lodges very small fish, which were for a long time supposed to be its young. It was thought the female kept her young in her mouth, as the marsupials keep their infants in a pouch; but it is now known that they are adults and completely developed, but, instead of living by their own labors, they prefer to lodge in the mouth of a good-natured neighbor, and take tithe of the food that comes in. We see that in the animal kingdom it is not always the big which make use of the little.

Dr. Bleeker, an able naturalist who has rendered good service to science, makes us acquainted with an association of a still more remarkable character — that of a Crustacean who makes use of a fish — the black *Stromatée* of the Indian seas lodges in its mouth a *Cymothoa*, who, if not well adapted for catching his prey in a free state, is perfectly organized for swallowing what comes to him in this position. In the China seas Dr. Collingwood found an anemone not less than two feet in diameter, in whose interior lively little fish resided, the name of which he did not know; and without quitting our shores we may observe an elegant jelly-fish (*Chrysaora isocela*)? sheltering many young scad (*Caranx trachurus*), which surprise us by swimming out from the body of their host. It is, however, amongst the Crustaceans that we shall find the most remarkable examples of free fellow-boarders. The Crustaceans comprise lobsters, crabs, cray-fish, and legions of small animals who act as the sanitary police of the shores, and purify their waters of organic matters which would otherwise corrupt them. They are not like the insects, variegated and glittering in color; but their forms are robust and diverse, and they often please by some special attraction. Amongst these Crustacean free-boarders one of the most interesting, though one of the least, is that tiny crab, the pea-crab, which lives in mussel-shells, and has been wrongfully accused of injuring the quality of their host as food. The ancients, who knew the pea-crab of pinna, thought that the mollusks having no eyes were glad to avail themselves of the good sight of the crabs. These, like other Crustaceans of the same rank, carry on each side of the carapace, at the end of a movable support, a charming little globe, furnished with hundreds of eyes, which they can direct, as an astronomer turns his telescope, to any part of the firmament. What cannot be doubted is, that the little intruders live on good terms with the mussels, and if the latter supply a convenient and safe lodging, they on their side profit largely by the morsels which fall from the claws of their guests, who are well placed and well provided with prey-catching apparatus. Snugly seated in their living house at the bottom of the sea, they possess a movable lair which the mussel carries about, and they can choose the best moment for attack, and fall upon the enemy unawares.

An association of a different kind, and the nature of which is difficult to appreciate, is that of a little crab, the turtle crab of Brown, found in the open sea on the carapace of sea-turtles, and sometimes on sea-weed (*fucus*). The sight of this crab is said to have given confidence to Columbus eighteen days before his discovery of the new world.

Amongst all the cases of companionship none are more remarkable than

those of the soldier, or hermit crabs, so abundant on our coasts. These creatures, as is well known, are decapod Crustaceans, somewhat resembling miniature lobsters, who make their abode in deserted shells, and change both their skin and their dwelling as they increase in size. The young ones are contented with very small habitations. The shells they inhabit are derelicts they find at the bottom of the sea, and in which they conceal their weakness and personal disadvantages with obstinate persistence. These creatures have too soft an abdomen to confront the dangers they encounter in their incessant wars, and the shells in which they thrust themselves supply at once lodgings and shields. Armed thus from head to foot the soldier crab marches proudly against his enemies, and fears no danger, because he has a secure retreat. But this soldier, or hermit crab, is not alone in his dwelling. He is not an anchorite like those dwelling in air, for by his side a worm is commonly installed as fellow-boarder with him, forming one of the most remarkable associations which is known. The companion worm is elongated like all the Nereids, and its supple undulating body is armed along its sides with bundles of lances, pikes, and daggers, the wounds from which are very dangerous. The crab, ensconced in his borrowed armor, and flanked by his terrible acolyte, attacks all he finds before him, and knows no reverse. Thus around his domain we observe a prosperity not seen elsewhere, and on his shell there usually flourishes a whole colony of Hydractinia blooming like a flower-bed, and inside we often find Peltogaster, Lyriope, and other Crustaceans who convert it into a true pandemonium.

On the English coast is another soldier crab, who has for his principal fellow-boarder a sea-anemone. This connection is remarkable on many accounts, and especially for the good understanding which subsists between the crab and his attendant. Lieut.-Colonel Stuart Wortley has not hesitated to pry into the domestic life of these creatures, and this is what he says about them. The hermit crab never fails to offer the best morsels of his captures to his neighbor, and frequently inquires during the journey if he is hungry. But it is when the crab has to change his house that his care and attention are redoubled. He assists the anemone to move with all the address of which he is capable, and if the proposed new house does not suit him another is selected, that the Adamsia may be fully satisfied.

More than a hundred species of soldier crabs, scattered through all seas, are known, and all lead the same sort of life.

Another sort of companionship is noticed amongst crabs of the genus *Dromia* (Squinado), which are of moderate size, and instead of lodging in a cell, dress themselves up from their early youth with a living colony of polyps, who grow with their growth. This colony has for its usual basis a live Alcyonium (Mermaid's Finger, or Cow pap), which covers the carapace and adapts itself as it develops to the inequalities of the cephalo-thorax, so that it seems an integral portion of the crab. Sertularia and Coryne grow in abundance upon the Alcyonium, mixed with sea-weeds, and the Squinado, masked by the living burden which he bears like Atlas on his shoulders, marches sedately to the capture of his prey. Concealed in the bush of a virgin forest, he has no fear of attracting the attention of an enemy. There are many mysteries to bring to light concerning the inoffensive population which the Squinado carries whenever he has blood to shed.

The isopod Crustaceans include a division of animals regularly formed, and somewhat resembling wood-lice, which live on various fish — the Cymathoads — armed with strong hooks for attachment, but often, when the whim takes them, swim away from one fish and fasten on another. They are true fellow-boarders, who like being carried by others better than using their own paddles. They are found in all seas, and Dr. Bleeker made us acquainted with many belonging to the In-

dian Ocean. On the coasts of Britain, where different species of Wrasse are common, it is rare to find one of these fish who does not lodge a couple of these Crustaceans.

Besides the barnacles who live as fellow-boarders on the whales, the latter give lodging on the surface of their skins to Crustaceans, who preserve their liberty, and quit one host to establish themselves on another. These are the whale lice (*Cyami*), who live upon the Cetaceæ as the previously mentioned isopods live on fish. The members of the genus *Caprella* usually attach themselves either to whales, or turtles, or fish, or to Sertulariæ, and appear to live under the same conditions.

The class of worms not only comprises parasites, but possesses likewise, as we shall soon see, fellow-boarders also. We find them on Mollusks, on animals of their own class, on Echinoderms, and even on Polyps. One of the most curious worms is the Myzostome, which lives on the Comatula, the true nature of which has just been revealed by the labors of Mecnikow. These Myzostomes resemble Trematode worms, but they possess symmetrical appendages covered with vibratile cilia. They run about the Echinoderms with remarkable rapidity, and have not yet been found in other situations.

There are many worms which live as companions in the same sheath with their congeners, and even with included Mollusks.

Fixed Fellow-Boarders.

The fellow-boarders of which we have been speaking, preserve their full and entire independence at all periods of their lives, and as they only undergo ordinary changes in form, their true nature has rarely been misunderstood. By the side of these we see others who are only free during their young days, and when the epoch of puberty approaches they make choice of a host, throw off all their travelling appendages, including their eyes, change their clothes, and become completely dependant upon the animal that carries them. Others, again, only renounce their independence for a time, and preserve even during their sequestration their proper form and their organs of locomotion. The most interesting of the fixed fellow-boarders are evidently the barnacles which cover the skin of whales. They are like all the others, free during their infancy; but for motives of their own, they locate themselves on the head or the back of these great Cetaceans, which they never quit when once settled. That which is of especial importance to these companionships is that each whale lodges particular species, so that the fellow-boarding Crustacea are like a flag of nationality, and the equipment causes the ship to be recognized. The great northern whale *Mysticetus*, which our hardy and patient neighbors discovered on seceking a passage to India by the East, a species which never quits the ice, does not carry barnacles. It is this whale that was already known to Iceland fishermen of the twelfth century. These intrepid whalers distinguished between a northern whale without calcareous adhesions, and a southern whale with them. This last is the celebrated whale of the temperate regions, the "North-Kaper," which the Basques hunted from the tenth century in the Channel, and which at a later period they chased as far as Iceland.

We also find characteristic Cirripeds on the genus *Megoptera* on dolphins, on some of the sharks, and on tortoises, and their inferior ranks are met with on sponges, and in the tissues of many true Polyps. But if the greater part of these Crustaceans lose their proper physiognomy while possessing the appendages symmetrically disposed round the mouth, there are also some who get rid of all their external apparatus and become a mere sac of sexual organs, such as *Sacculina* and *Peltogaster*, who lead a miserable life in the abdomen of common crabs or on the backs of soldier crabs. We also see Cirripeds establishing themselves on other Cirripeds, losing their appendages, and taking the form of the larva of a Diptera. The genera *Otion* and *Cineras*, which we find on the

keels of ships, as well as on the bodies of fish, are fellow-boarders on other Cirripeds, but preserving their own form.

From the time of the ancients a fish was known, whose position was not well made out until our day, and which seems to belong to the category of fellow-boarders. It is the *Echineis*, or Remora, an animal found in the Mediterranean and other seas, attached to the bodies of large fish, especially sharks, by means of an apparatus for adhesion situated on its head. It has sometimes been confounded with the pilot fish. It is a fellow-boarder, but, contrary to those just mentioned, can free itself when it pleases, and seek a new host. It lives by its captures during the voyage. The Remora has always attracted the attention of observers. In the eyes of the ancients a singular being, no matter of what sort, must have some peculiar action upon the animal economy, and could not fail to enter into the composition of divers therapeutic preparations. Pliny pretends that the Remora served to compose poisons capable of extinguishing the fires of love.

The sailors now, as of old, are convinced that if one of these little fish adheres to a ship it arrests its course.

That which is not doubtful is that the inhabitants of the coast of Mozambique turn to account the Remora's faculty of attaching itself to animals, for they put a ring in its tail, to which they attach a line, and let it go in the sea and stick to what prey it may find. Thus Remora-fishing is the counterpart of hawking.

Amongst the Polyzoa there is a curious genus living on Annelids, and concerning the nature of which we have been led into error. M. Hesse represented it as a Trematode with a stalked sucker situated behind, and we have given it the name of *Cyclatella*, which ought to be abandoned. The pretended Trematode is a true Polyzoon belonging to to the genus *Loxosma*, and which lives as a fellow-boarder fixed on the Annelids.

There are likewise fellow-boarders, who in their early growth place themselves under the protection of a complaisant neighbor or a parent, and are then transported to their destination. These do not lose the character of their youth. Among them are the young of the Caligus; for, according to the observations of M. Hesse, of Brest, these Crustaceans, in order to reach the fish they are destined for, attach themselves to a parent or a friend by the aid of an appendix of the cephalo-thorax, and are rowed to their residence.

Forty years ago Jacobson of Copenhagen wrote a memoir to demonstrate that the young bivalves which are found on the external branchiæ of Anodonts are parasites, for which he proposed the name *Glochidium*, and Blainville and Duméril were requested to report on this paper, which was sent to the French Academy. Their opinion gained few supporters, and it is now well known that the young Anodonts differ considerably from the adults, and that during their sojourn in the branchiæ they carry a long cable which descends from the middle of the foot. What is this cable for? Is it to attach the young Anodont to the body of some fish which will carry it to a distance? The Anodonts have not, like other Acephala, or headless Mollusks, vibratile wheels to disperse themselves.

At the bottom of ponds and rivers there are Rotifers and Infusoria which attach themselves to Crustaceans and insects, and travel like the Cirripeds of the whales. There thus exist fellow-boarders of the two categories in the lower ranks of aquatic animals.

We shall finish by remarking, that in all combinations between individuals of different sexes, as between those of different species, we always find the object attained, the conservation of the individual and the conservation of the species. These phenomena evidently depend on the secret ordinance of Providence, and the life of the humblest worm hangs from the same thread as that of the greatest mammal. A breath suffices for their creation and their annihilation. God holds the chains of all their existences, and conducts them to their end. It is for us to observe the facts, and to guess in generalizing them

the laws by which they are regulated. And if we have need of an hypothesis to guide us through the dark places, do not let us assign to it the importance of a scientific conquest, for this hypothesis is only a beacon to guide us on our route.

DYEING.

TAKING account of the variety of tints which flowers present, the idea might naturally arise that flowers would lend much aid to the dyer. It does not chance, however, to be so. On the instant I can only remember one flower — a yellow flower, the *carthamus tinctorius*, or safflower, that contributes to the dye vat, and even in this solitary case the color is fugitive. Many attempts have been made to fix on textile fabrics the coloring principles of flowers, but always without avail. The vegetable kingdom contributes many things to the dye vat, but mostly chips of certain colored woods are laid under contribution. Indigo, however, is a sort of dried extract from a herb — the *Indigotis indigofera*—concerning which more will have to be set down hereafter. Besides dyes of vegetable origin, the mineral and the animal kingdom both yield many things useful to the dyer. The celebrated Tyrian purple was evolved from two species of shell-fish. Kermes, yielding the only scarlet known to ancient Greek and Roman dyers, was the produce of an insect found along many parts of the Mediterranean coast. Cochineal is the dried body of an insect indigenous to Mexico. As for dyes obtained from the mineral kingdom, they are far too numerous for recapitulation here. Given any particular dye material to a novice in the art of dyeing, and left to his own devices for permanently fixing it, he would find in most cases the task beyond his powers. Having immersed some colorless woven fabric in a solution of the dye stuff, and brought it out with color seemingly attached, the operator would most usually find that the act of washing even in simple water would remove all the coloring material. In the course of long years practical artists, by trial and experience alone, devised means of fixing permanently certain colors by processes the theory of which was unknown to themselves. Until chemistry became far enough advanced to make known the conditions under which colors might be made to attach to fabrics, if capable of attachment, no certain principles could be laid down for the guidance of operators; now, however, to do this is easy.

Although it be difficult to establish generalizations for coloring matters used in dyeing, yet so far as it goes the following rule holds good. All coloring matters obtained from animal or vegetable sources by process of mere extraction, have a tendency to unite with alumina (the earthy matter of alum), also with oxide of tin, forming a class of bodies known in commerce as lakes. These lakes are much used in painting, as every artist knows. They are used in dyeing also, but not as lakes, but in a way that the following description will make manifest. Assume that we have some coloring matter, it signifies not what; assume that it will not combine with thread or tissue, but will combine with alumina or with oxide of tin; assume further (which sometimes happens), that the alumina or the oxide of tin has an affinity for the material to be dyed. Under these circumstances, would it seem unreasonable to assume that, the tissue being charged with the alumina or the oxide of tin first, and then the tissue submitted to the dye vat, permanent coloration would ensue? This actually happens in many cases, wherefore alumina and oxide of tin are recognized by the dyer as two of his most valuable mordants, so called from *mordere*, to bite, seeing that they bite, so to speak, the color into the cloth. Again, remembering that animal substances, as the rule, absorb coloring matters

with greater facility, and retain them more permanently than vegetable substances, the question would naturally arise whether vegetable tissue cannot be impregnated with some animal matter to act as a mordant? In practice this is done, and extensively done. Perhaps the most notable example is seen in the dyeing of cotton Turkey red. Everybody knows that Turkey red is a very beautiful color. It is produced by madder, the coloring agency of which will not attach itself to cotton that has not been mordanted, or, so to speak, animalized. As we are not to be made practical dyers through the information here conveyed, as my intent is merely that readers shall glean first principles, I would rather not particularize the exact animal substances used for this mordanting of cotton, in the process of dyeing it Turkey red. Sheep's blood is one, and that the most delicate of the lot; as for the others, people whose craving for knowledge makes them dissatisfied with my slender sketch, had better consult some technical dictionary or cyclopædia, and study what is therein set down under the heading of Turkey red.

The first point then to be apprehended in relation to this subject, is that particular dye colors do not attach themselves to all textile fabrics alike. Soldiers' red, for example, may be imparted to wool readily, under a certain mode of treatment; but neither silk, nor cotton, nor linen, will receive the dye at all in any practical condition of permanence or original beauty. The second point to be apprehended is, that while certain dyes — the ancient Tyrian purple, for example — attach themselves to fabrics adapted for their reception, without the intervention of any second thing, other dyes require that second thing — hence the distinction drawn between dyes substantive and dyes adjective. Comparatively few dye materials will act without mordanting, and hence the difficulty of dyeing in domestic practice. It is not, either, as though all mordants acted in one and the same way. They do not, the theory of their action being very diverse; so that, in point of fact, to understand dyeing, and still more calico-printing, aright, one need have a theoretical acquaintance at least with the principles of chemistry. The two chief mordants, or rather classes of mordants, are, as we have said, preparations of alumina and preparations of tin.

Besides the occasions involving the production of lakes — the designation lake being exclusively appropriated to compounds of oxide of tin, or of alumina, with coloring matter — the device of forming a third compound in the tissue to be dyed has wider applications. For example, if prussiate of potash be brought into contact with almost any iron solution, or infusion of gall nuts into contact with the same, tints are immediately developed — a blue tint in the first case, a black tint in the second. Now it happens that oxide of iron has a strong tendency to unite with animal and vegetable fabrics, especially the latter. What is commonly called an iron mould well illustrates the fact, an iron mould being nothing else than a combination of peroxide of iron with the fibres of a woven material. Suppose, then, the dyer to have established an iron mould purposely — suppose him to have immersed a woven fabric into some solution of iron, and promoted combination of tissue with peroxide of iron. If the dyer had resolved to tint his fabric of a dingy red color, his work would already be done. That not being his intention, resolving to effect a brilliant blue tint, what does he do? What I have already indicated; the dyer steeps his iron-moulded tissue in a solution of prussiate of potash, when Prussian blue is formed upon, or rather within, the fibres; the tissue goes into the vat a rusty red, but it comes out blue. The most important blue dyeing agent, however, is indigo, a vegetable product having numerous remarkable properties. The substance known as indigo is found in many vegetables juices, even some animal juices; but the East Indian indigo plant is the only one from which it is now produced in commercial quantities. Next to the Indian plant, the *Isatis tinctoria*, or wood, is the most important for its indigo produce. When the

Romans first came to Britain, they found the natives tattooed or skin-stained with blue hieroglyphics. The material used was wood, or rather indigo from wood.

Indigo, as I before remarked, is endowed with many remarkable properties. Indigo, at least blue indigo, does not exist in the juices of plants that yield blue indigo, the latter being only developed by a sort of fermentation. Blue indigo is insoluble in water, and it is clear that no body, whilst insoluble, can be used for dyeing. The problem, then, the dyer has to solve, is how to make blue indigo soluble in the first place, next insoluble once more, in order that it may not be removable by the rough usage of washing. Two processes essentially different in their nature are available for effecting the solution of indigo, each applicable to practice in its own particular set of cases. Water does not dissolve blue indigo, but oil of vitriol does, and water dissolves the solution in oil of vitriol; so in this process one way is suggested of using an indigo dye. Woollen cloths, indeed, are dyed blue by immersing them in this very solution, to which the denomination of Saxon blue is commonly applied; but most other dyeing and fabric-printing operations involving the use of indigo, involve a different utilization of this curious material. This blue indigo, robbed of oxygen, becomes changed to white indigo— very soluble in water — and this rapidly changes to blue indigo again on exposure to the air. Out of the application of this principle comes another method of employing indigo for tinctorial art. Deoxydize blue indigo, by contact with some material having a tendency to unite with oxygen, convert it into white soluble indigo, present this latter to the tissue we require to be dyed; let the tissue saturate itself, then expose the tissue to air, and allow absorption of atmospheric oxygen to convert it back to blue again. The reconversion is extremely rapid — even too rapid for the cotton printer's convenience in some cases. The following is a case in point, and it will show to what ingenuities of chemistry and mechanism cotton printers must have recourse in the successful use of certain tinctorial bodies. To represent white figures on a blue field of indigo dye is easy enough, the piece having only to be dyed one even blue throughout, then the white parts bleached out by the process of chlorine discharge. To represent blue indigo figures on a white ground is a problem of greater complexity, seeing that the blue figures cannot be impressed by dipping, an operation which gives time for the fluid to enter amongst the fibres, but must be impressed by stamping, which necessitating much air contact, the white indigo becomes oxydized blue, and insoluble before the device can have firmly attached itself. The requisition here — the indication to be fulfilled — is time to be given for the white indigo to soak in *as* white indigo. If for a few seconds the fabric could be withdrawn from contact with atmospheric air, or if instead of contact with atmospheric air, some non-oxygenous gas could be substituted, the cotton printer would achieve his desire. The latter device is precisely the one he does have recourse to, or at least *did* have recourse to a few years ago. It is best to speak thus guardedly, since cotton printers are obliged to assume and discard processes they have labored to achieve, with change of fashion and of female taste. The device was to pass the white indigo-printed fabric through one slit of india-rubber, into a box filled with hydrogen, and through another slit out of the box into the oxygen-giving air. Whilst in the box the white indigo would remain white indigo; when out of the box it would be changed to blue indigo. This was ingenious, but hardly more ingenious than several other processes in the practices of figure texture dyeing called printing. If it seem that the operations of dyeing and printing are mixed together in this sketch, my answer is, they are so mixed together in practice, that to dissociate them is next to impossible.

I must here state, that advanced though chemists be, and clever its votaries, yet the problem of using certain cherished colors as dye stuffs has not

yet been solved. Philosophers who have devoted their best years to the study of feminine character aver, one and all, that ladies are exacting — unreasonably exacting — at times, even to the desire for achieving impossibilities. Two lovely coloring matters ladies have long set their regards on — French ultramarine, a lovely blue, and mineral green, otherwise called Scheele's green. Chemists have done their very best to use these things as honest dyes; but, foiled in their attempts, and urged by feminine clamor, they use them dishonestly. If a coloring matter cannot be bitten into a tissue it may at least be stuck on, and so French ultramarine in powder, and Scheele's, or mineral green, are stuck on to certain fancy warps and wefts of female attire. The cement used for sticking them on is Dutch cheese, dissolved in hartshorn. Of course, the painted tissues will not wash — that is a small matter. The worst has to be told; mineral green is an arsenical compound, and arsenic — well, it is a poison. One of these green-clad ladies is a sort of moving upas-tree, with the difference that what the Dutchman wrote about the upas-tree was fiction, whereas what I have to say about green ladies is a fact. They scatter poison around them as they go.

JOHN WESLEY AS A DOCTOR.—Not many perhaps of those to whom the name and fame of John Wesley are known, identify the great sectary with the work of which he was not a little proud, his "Primitive Physic, or an Easy and Natural Method of Curing Most Diseases," printed by William Pine, in Narrow Wine Street, Bristol, and sold at the New Room in the Horse Fair, and in London, 1762. It was lately submitted for the edification of the pharmaceutists at their Liverpool conference, among a century of old books, and Wesley's announcement that "every man of common sense (unless in some rare cases) may prescribe either to himself or his neighbor, and may be very secure from doing harm where he can do no good," was compared with his old recipes. Among the remedies which he approves as "tried" — a word which he thus made proverbial in the Methodist connection — is bleeding for consumption. The patient is to lose six ounces of blood every day for a fortnight if he live so long, and then every other day, then every third day, and every fifth day for the same time. The gout is to be cured by the application of a raw lean beefsteak; for twisting of the bowels, one, two, or three pounds of quicksilver in water. The pharmaceutists came to the conclusion that Wesley was more successful as a theologian than a physician, and that his experience of the value of "untutored common sense" in his former capacity had induced him to undervalue the necessity for a basis of skilled knowledge in the latter.

Medical and Surgical Reporter.

HEART WORK.—The average weight of a human heart is nine ounces and a half. Its work in a day is equal to raising one hundred and twenty-four tons one foot high. The height to which it could raise its own weight in one hour equals nineteen thousand seven hundred and fifty-four feet. The best effort in mountain climbing is only equal to one-twentieth of the energy of the heart for similar periods of exertion.

A SERMON in four words on the vanity of earthly possessions—"Shrouds have no pockets."

IN the indulgences of the table lie the seeds of disease.

MISERY requires action; happiness, repose.

AMUSEMENT is the happiness of those who cannot think.

A PERSONAL obligation — To eat.

QUILLS are things that sometimes are taken from the *pinions* of one goose to spread the *opinions* of another.

"VERY good, but rather too pointed," as the fish said when it swallowed the bait.

IDEAL FEET. — The greatest classical writers of antiquity — Horace, Catullus, and others — who had great appreciation of feminine beauty, never mentioned, in the descriptions of their beloved, their small feet. The people belonging to the Celtic race have small feet; the Hindoos, especially, have such small feet and hands that they may be envied by many European countesses. The native troops of the English army in India possess in England their own armory, whose peculiar kinds of weapons are constructed for them. The sword-hilts made for them are much too small for us to grasp with ease. The greatest beauties of Europe — the Italians — have really long and broad feet.

"MEDICAL WRINKLES." — The quaint and practical Thomas Inman, M.D., of Liverpool, in one of his readable essays on the "Restoration of Health," thus remarks: "Do you wish to ascertain the health of a baby, feel the condition of its buttocks. If these are firm and elastic, one may always be sure that the little one is strong and well; but if, on the other hand, they are soft, as if they were boiled turnips in a bladder, it is certain that the child is out of sorts." — *Med. Record.*

ANY PORT IN A STORM. — A certain doctor was apt to quarrel with his wife. Returning from a professional visit, he was overtaken by a terrible storm. A return hearse came up, going homeward. The doctor crept in, with pall and plumes for his companions. The hearse stopped at the door; the lady looked out. "Who have you got there, coachman?" "The doctor, madam." "Well, thank heaven for granting me resignation! So the poor man has gone to his long home at last!" "Thank you, my love," said the doctor, getting out of the hearse, "for your kind regards for my safety." — *Med. Obs.*

LIFE ASSURANCE. — It is boldly affirmed that no American office, confining itself exclusively to *life* insurance business, has ever yet failed. The mutual method, the proprietary method, and a mixture of the two — all have their advocates. The tendency of modern opinion, however, is in favor of mutuality.

THE DOCTOR WILL CHARGE FOR IT. — A sick man, slightly convalescing, recently in conversation with a pious friend, who congratulated him upon his recovery, and asked him who his physician was, replied: "Dr. Jones brought me through." "No, no," said his friend, "God brought you out of your illness, not the doctor." "Well, may be he did, but I am certain the doctor will charge me for it."

"CAN you tell me what a smile is?" asked a gentleman of a little girl. — "Yes, sir; it's the *whisper of a laugh.*"

PRAYING AND ROWING. — Dr. Macleod and Dr. Watson were crossing a lake together in the West Highlands, in company with a number of passengers, when a storm came on with terrible force. One of the passengers was heard to say, "The twa ministers should begin to pray, or we'll a' be drooned." "Na, na," said the boatman, "the little ane can pray if he like; but the big ane maun tak' an oar."

A 'CUTE MISER. — A gentleman called on a rich miser, and found him at the table endeavoring to catch a fly. Presently he succeeded in entrapping one, which he immediately put into the sugar-bowl, and shut down the cover. The gentleman asked for an explanation of this singular sport. "I'll tell you," replied the miser, a triumphant grin over-spreading his countenance as he spoke, "I want to ascertain if the servants steal the sugar."

THERE have been many definitions of a gentleman, but the prettiest and most pathetic is that given by a young lady. "A gentleman," says she, "is a human being combining a woman's tenderness with a man's courage."

No wise man will allow either good health or apparent business success to blind him to the worth of an insurance policy. The uncertainties of life, and the sudden vicissitudes of trade, demand some certain provision for the future.

SOMEBODY thinks that if Nature had designed man to be a drunkard, he would have been constructed like a churn, so that the more he drank the firmer he would stand.

"TOMMY, my son, what are you doing there, with your feet dangling in the water?" "Trying to catch cold ma, so that I may have some more of those cough lozenges you gave me yesterday."

THE easiest and best way to expand the chest is to have a good, large heart in it. It saves the cost of gymnastics.

I LOVE THE MORN.

I LOVE the morn when o'er the earth
  The golden light is gently rolled,
And sing the stars, as, at the birth
  Of a new world, they sung of old.

I love the morn, its silent dews
  Which the flowers weep, its gorgeous sky,
Its air of balm, its brightening hues,
  Its deep though voiceless hymn of joy.

From every grove melodious song
  Ascends on high; all earth so fair
With new-born light, in silent throng,
  Seems wrapt in universal prayer.

REV. CHARLES NAISMITH.

Good Health.

A Popular Journal

On the Laws of Correct Living.

MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Sixth Paper.

Foods.

THE albuminous group of foods supplies the principal elements for the growth of the tissues of the body; the proportions of the four ingredients (albumen, fibrin, gelatin, and casein,) of which they are all composed are so nearly the same, that it makes but little difference, except for the gratification of the sense of taste, whether we eat the flesh of animals (fibrin), the white of eggs (albumen), the curd of milk (casein), or the flour of wheat (gluten); all of these are reduced in the stomach to a form of albumen, the raw material from which the body is made up. Still, it is a rule, proved by experiments, that an animal fed constantly on *any one* of these, for instance the white of eggs, may actually be starved to death, the stomach finally refusing to digest it. It is a remarkable fact that the only article of food naturally provided for animals of the highest group, contains elements from all the classes; *milk* contains water, sugar, oily matter, and curd, in various proportions, according to the animal. With the knowledge of this fact we can readily understand what a frightful cause of infantile disease must be the villainous compounds sold in cities under the name of milk. Wheat contains starch from the saccharine group, and gluten from the albuminous; hence its great value as an article of food.

We have seen that the albuminous group is distinguished by containing nitrogen; the great bulk of the food of herbivorous animals does not contain this element. The non-nitrogenous foods are used chiefly for the process of respiration, supplying a large part of the carbon necessary for the maintenance of the animal temperature. This is exemplified in the food of man in different climates — in the Arctic regions the Esquimo and Greenlander live principally on the fat of seals, bears, and whales; by such food only are they enabled to endure the extreme cold without seeming to suffer more than we do in our severe winters — the resident of the tropics lives chiefly on watery fruits and vegetables, with very little oily food; — from this we may learn to eat more of the oleaginous elements in winter than in summer, in order to keep up our animal heat. The carnivorous animal, eating no saccharine and little oily food, keeps up its animal heat only by disintegration of its own tissues, thus setting free the requisite carbon; in the menagerie we see the lion, the tiger, and similar animals, incessantly walking from one end of the cage to the other; this they do from instinct and necessity, for in no other way can they set free sufficient carbon for the respiratory process. The herbivorous animals, on the contrary, consume great quantities of saccharine and starchy matters, which, after supplying carbon for respiration, go to form fat, in proportion to the external warmth supplied to the animal. Man is placed between these two orders of animals; his digestive apparatus, teeth, and intestinal canal, as well as his instinctive propensities, indicate that a mixed vegetable and animal diet

is best suited to him. An exclusive diet of ordinary vegetables is not favorable to his full bodily or mental development; but bread may form almost the sole food with benefit, as the gluten of wheat is as well adapted to the nutrition of the body as is the flesh of animals. On the other hand, an exclusive animal diet is the least economical of all, as it scantily supplies the materials for respiration; — 15 lbs. of flesh contains no more carbon than 4 lbs. of starch; so that a person with an equal weight of meat and starch could support life very much longer than one restricted to the same weight of flesh alone. Thus we see the great advantage in point of economy of food, of a fixed agricultural community over wandering tribes of hunters. Wheat flour, containing gluten for nutrition, and starch for respiration, is the most useful article of food, and is rightly called the "staff of life."

The nutritive properties of vegetable substances may generally be estimated by the amount of nitrogen or azote they contain; this, in almost all cases, is less than that in good wheat flour. The following table represents the relative quantity of nitrogen in different articles of food; those which are poorest in nitrogen are richest in carbon and hydrogen, and therefore the best sustainers of the animal heat. The chemical composition of food, however, does not necessarily indicate its fitness as an article of diet, as this depends on the readiness with which it is digested and absorbed; a very nutritious article may be digested with difficulty, and therefore may be far inferior to one less nutritious but more easily digested. In this table, human milk is taken as the standard, and the nitrogen it contains is expressed by 100; this is not adapted, however, for sustaining the adult human body, and is surpassed by the milk of most other mammals, whose young bring their functions into full exercise much sooner than the human infant: —

Vegetable — Rice 81 — potatoes 84 — turnips and rye 106 — Indian corn 100 to 125 — barley 125 — oats 138 — white bread 142 — wheat 119 to 144 — carrots 150 — brown bread 166 — peas 239 — beans 320.

Animal — Human milk* 100 — cows' milk 237 — oysters and yolk of eggs 305 — cheese 331 to 447 — boiled salmon 610 — boiled ham 807 — boiled cod 816 — white of eggs 845 — veal 911 — beef 942.

There are certain mineral ingredients in food necessary for the support of the animal body. Common salt is necessary for the gastric juice and the bile; it exists in the flesh and fluids of animals, in milk, and in eggs; there is much less of it in the plant, hence the deficiency has to be supplied to cattle at a distance from the sea-board; the buffalo and deer resort to the salt springs in the West, hence called salt-licks; deprivation of salt in man, too, is a serious thing, as was in many cases proved in the late war. Cattle living near the sea do not require additional salt, as their food has sufficient, from the salt carried inland by the winds.

Phosphorus is required by the nervous tissue, and, in connection with lime, for the bony structure; the phosphorus is obtained from eggs, milk, and many other animal substances; the lime is obtained from the cereal grains, and especially wheat, and also

* According to the "Chemical News" of last year, the milk of animals in 1,000 parts contain —

	Water.	Butter.	Cheesy matter.	Sugar.	Mineral matter.
Woman	889.08	26.66	39.30	43.68	1.30
Cow	864.20	31.30	48.80	47.70	6.00
Goat	844.90	66.87	35.14	36.91	6.18
Ewe	832.32	51.37	69.78	39.43	7.16
Mare	904.30	24.36	33.35	32.76	5.23
Ass	890.12	18.53	35.65	50.46	5.24
Sow	818.00	60.00	53.00	60.70	8.30

Proportions of solids and water in different kinds of milk.

	Woman.	Cow.	Goat.	Ewe.	Mare.	Ass.	Sow.
Water	889.08	864.20	844.90	832.32	904.30	890.12	818.00
Solids	110.92	135.80	155.10	167.68	95.70	109.88	182.00
	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00

exists in all hard water — were they not deficient in phosphate of lime, the leguminous seeds, as peas and beans, would be more nutritious than wheat, as they contain considerably more nitrogen.

Sulphur exists in the body, and is obtained from flesh, milk, plants, and eggs; the blackening of silver spoons is owing to the sulphur they contain. We find iron in the red globules of the blood, and get it from flesh, and most vegetables, as potatoes, cabbage, peas, mustard, etc.

The quantity of food absolutely required in health varies according to sex, age, constitution, and habits of life. The appetite is the best guide we have; we ought to eat *when* we are hungry, but to eat *as long as* we are hungry is not always wise, perhaps never. Hunger does not depend so much on the emptiness of the stomach, as upon the demand of the system for food, and eating cannot immediately satisfy this demand; so that if we bolt our food, we may take into the stomach much more than the system needs. Here again, we see the wisdom of chewing what we eat; the time thus taken up (to say nothing of the mechanical division of the food) allows the system to become aware of the fact that its wants are being supplied, and thus prevents our taking more than the necessary amount. When we feel a sensation of perfect satisfaction and quiet content, we have had enough. How few persons follow the wise old maxim, "always get up from the table hungry"? how many eat too much or eat too quickly, even though they leave off with an appetite! Excess of food kills thousands, where want of it kills one.

From experiments in prisons, and in the army and navy, it is known that thirty-five ounces of solid food daily are sufficient to maintain health; of this twenty-six ounces may be vegetable, and the rest animal, if active exercise be taken; sugar and cocoa are (or were) allowed in the British Navy in exchange for ardent spirits. In the case of prisoners, a few ounces less is sufficient for health. During the late war in the South, our army was fed much better than this; probably no army ever took the field so well fed and clothed as ours; it is also true that eating too much, or eating salted meals with too few vegetables, was the cause of the scurvy, inevitable under such circumstances in the unhealthy regions of that part of the country.

The smallest quantity of food upon which life is known to have been supported with vigor, for a long time, is that upon which the famous Cornaro lived; he ate only twelve ounces a day, chiefly vegetable, for fifty-eight years, reaching a very advanced age; the records of shipwrecks and similar disasters show that life may be prolonged for a considerable time on a very limited supply of food, but with great loss of vigor.

From the records of gluttony, to show how much can be eaten at a time, may be mentioned the following: According to Captain Parry, a young Esquimo devoured in twenty-four hours thirty-five pounds, including tallow candles — the half-breed "voyageurs" of Canada and the Siberian Cossacks consume an amount of animal food that would be fatal to those unaccustomed to it; the former, according to Sir John Franklin, are very discontented when put on a short allowance of eight pounds of meat a day, their usual allowance being from twelve to twenty pounds — these amounts are much larger than the thirty-five pounds of the army and navy, of which only about one-fifth is animal food; but it must be remembered that the greater part of this arctic diet goes to maintain the respiratory process and the animal heat.

Much on this point may be learned from the annals and customs of the prize ring. Jackson, a famous trainer of athletes in England, gives the following account of the diet he found best for this purpose, and a similar course may be recommended to many suffering from dyspepsia, or from the accumulation of fat. Begin, he says, on what may be called a "clear foundation," that is, by giving an emetic and two or three purges; the lean of fat beaf and mutton constitutes the

principal food; veal, lamb, and pork are less digestible, especially the last — no vegetables; stale bread; breakfast at eight, dinner at two, and a light supper at eight, two hours before bedtime. Broiled meats were found to be better than roasted or boiled; no fish, nor fermented liquors, nor butter, nor cheese, nor pastry (dumplings being likened to "earthenware" in the stomach); and three and a half pints of fluid: this diet being accompanied by active exercise; it resembles that used by the American Indians when about to begin a long march.

The reduction of the food in the stomach is not due to mechanical action of its walls; meat, enclosed in perforated metallic globes, is dissolved by the gastric juice, the stomachal walls not coming into contact with it. Neither is it due to putrefaction, as this fluid has been found to prevent rather than to cause decay. It is now known to be effected by chemical solution. The chief objection to this theory was the difficulty of imagining any simple chemical solvent powerful enough to reduce the complex substances used as food to a mass apparently the same in all cases; this objection is now answered by the close chemical relation known to exist between these substances, and the consequent deduction that the process of solution may be of a very simple character.

The gastric juice dissolves only animal and vegetable substances of the nitrogenous kind, leaving the starchy and oily matters to be acted upon by other secretions, as will be seen in the next paper of this series. Though so powerful a solvent of dead substances, it does not injure the living stomach which contains it; worms remain for a long time in the human and animal stomachs with impunity; these lower orders of intestinal worms have no proper respiratory and digestive apparatus, these functions being performed chiefly by their delicate skins, but any vertebrate animal would very soon be destroyed by the action of this fluid; the stories of batrachian and reptile forms living in the human stomach for any length of time are impossible, arising from errors of observation. After death, the gastric juice, which retains its activity for a while, sometimes dissolves the coats of the stomach; and there is reason to believe that, in some diseases, the work of destruction commences before death.

Experiments show that the mean time required for digestion of the ordinary substances used as food is from three to four hours. As a general rule, the flesh of wild animals is more easy of digestion than that of domesticated ones, probably on account of the little fat it contains; beef is more speedily reduced than veal or pork, and mutton sooner than beef; turkey is, except venison, the most soluble of all kinds of flesh. Violent exercise after meals retards digestion; so does the use of alcoholic stimulants, by coagulating the pepsin necessary for perfect digestion; were it not for their rapid absorption by the veins of the stomach, wine and ardent spirits during dinner would put a complete stop to digestion.

We often laugh at the exaggerated idea of Yankee ingenuity making a machine, into one end of which a living hog shall be put, and, by a simple turn of a crank, shall come out at the other made into cured hams, joints for the spit, prepared lard, sausages, pigs' feet, bristles, brushes, and various other articles manufactured from this uncleanly but useful beast. But how much more wonderful than such a machine is the simple process of digestion! From the seizing of the food, through the processes of mastication and swallowing, to the reduction of various kinds of incongruous substances into a homogeneous *chyme*; the provision for getting rid of injurious and superfluous articles; the absorption by the veins of the stomach and the intestinal lacteals; the changes induced by the bile and other secretions — all combining to form the nutritious *chyle*, which may be called the blood in its formative stage, and consequently the source of the nutrition of the whole body? Even this superficial view of the digestive process must elicit our admiration, and lead us to reflect on the control we have over it in selecting our food, and on the

serious disorders we have the power of bringing upon ourselves by injudicious eating. So fertile a cause of disease is this, that it is no exaggeration to say that more than one-half, probably three-fourths, of all human diseases, which embitter or cut short life, are directly or indirectly dependent on what we eat, in excess of the demands of the system. Man is the only animal that habitually eats too much; this being the fact, it may be said that, in one very important sense at least, that which *entereth into the mouth* defileth a man.

COUGH.

Second Paper.

COUGH very often occurs in children from slight irritation, due to teething or indigestion, and in adults from a similar disturbance in the mucous membrane of the throat, due to a dyspeptic or gouty condition. It may be easy to stop the cough with "soothing syrup" or opiate drops; but the real evil which caused the cough is thus concealed, and goes on increasing. In consumption there is great danger in relieving symptoms — ease from cough or a quiet night being dearly purchased at the expense of the general health. Remedies that promote secretion (expectorants), such as ipecacuanha or squill, are to be avoided, as a general rule, in consumption, as we ought to lessen rather than increase secretion, and for this purpose cod-liver oil and iron are much more useful than astringents.

We can often discover in a moment what is the nature and seat of a malady by the character of the cough. Indeed, some doctors find it so invaluable a guide, that they would fain rehabilitate the old Roman deity "Tussis," the god of cough, whose ruined temple is still to be seen in Italy!

Cough dependent on disorder of the nervous system, such, for instance, as the loud barking cough of hysteria, yields to change of air, splash-baths, and invigorating tonics.

If an enlarged tonsil is the cause, it may be easily seen, and removed by the knife without much pain. If the epiglottis, or any part of the voice-box, is the seat of disease, the laryngeal mirror enables us to detect the cause and remove it. Much patience and perseverance, however, are needed effectually to cure long-standing affections of the larynx; and were it not that the gradual improvement can be watched, and the applications modified according to the state of the part affected, success would be impossible.

It is thus that instruments like the laryngoscope and the stethoscope are of such value, for they enable the physician to judge of the effect of remedies upon internal organs with the same precision as the surgeon who deals with external parts. By means of these instruments, disorders may often be detected in an early stage before incurable disorganization has occurred. The stethoscope affords such precise information as to the condition of the chest, that the physician, detecting traces of uncured bronchitis, pleurisy, or inflammation of the lung, induces his patient, though he may feel well, to avoid exposure and thus prevent a recurrence of mischief. A lung when inflamed is red and swollen, like an inflamed gland, and is as slowly restored to its natural state. But, as there are no nerves of common sensation in the lung, and therefore no pain, the cough or the doctor's stethoscope can alone discover the existence and continuance of the evil. If a patient, under such circumstances, believes the authoritative statement of his medical adviser that there is latent evil ready to burst into flame, he will be willing to adopt precautionary measures, the necessity of which his own sensations would not have suggested. A less experienced physician would, perhaps, have been satisfied to check the cough; when the patient, thinking that he is well, exposes himself in his ordinary occupation, and returns to

the doctor suffering from a malady no longer capable of cure.

Our variable climate, which makes us so prone to catch cold, is one of the chief causes also of the prevalence of consumption — "phthisis," as it is called — in this country; for neglected inflammation in the chest is perhaps the most common cause of consumption. A man gets a cold, exposes himself to sudden atmospheric changes, secondary inflammation is set up, followed by destructive action in the lung, and ending in rapid phthisis — "galloping consumption." If our poor, on being discharged from hospitals, could have their health established in a convalescent home, much of this evil would be prevented; for consumption independent of previous inflammation is very rare.

Of all the symptoms of this disease, cough is perhaps complained of most, and it is often difficult to allay it without employing remedies which interfere with digestion, diminish rallying power, and lessen the prospect of real amendment. When a cough is stopped by sedatives, it is apt to become harder and tighter when it does occur than it was before, and sensible people frequently find this out for themselves: curing the cough is often but another term for killing the patient. It has been well said that from the time opium is used real improvement in general health cannot be expected, and the frightful mortality of chest disease is greatly due to the use of sedatives for the relief of symptoms.

Warm or irritating applications to the skin over the part affected are frequently better than all cough mixtures. Rest in bed during the early or feverish stage of chest attacks is often essential; and when cough is due to active mischief in the lung, the patient should be persuaded not to expect the cough to be cured till the lung is better.

Sometimes, however, cough is so constant, severe, and exhausting, that it urgently calls for attention. Some, it is to be feared, are too lazy to investigate the cause or select a remedy appropriate for the individual case; powerful sedatives, like morphia, which are sure to give immediate ease, are hence the most popular drugs with such persons; but the cough may generally be controlled without strong sedatives; and if the doctor looks beyond the immediate symptom to its cause, he may be able to remove it without doing harm.

Thus a dry, frequent, harassing cough, arising from undue redness and irritation about the uvula, tonsils, or back of the throat, may be relieved at once by the application of nitrate of silver or by astringent lozenges. A simple demulcent drink, as barley-water, linseed tea, or Iceland moss, will supply the needed sheath to the dry, hot membrane, and at the same time promote healthful perspiration. By sucking ice, gum, or liquorice, much comfort may be gained. If the larynx or epiglottis is the part affected, steaming the throat may be useful. The new popular inhalers, by means of which "spray" is thrown into the throat, are more valuable still. Alum, iron, henbane, soda, or sulphurous acid may be thus "atomized" and inhaled according to the condition and requirements of the parts affected. Sickness occurring after coughing may be allayed by sedative inhalations, and stramonium or hemlock (conium) often calms preternatural sensibility of membrane, and allays spasmodic cough as well as spasmodic asthma — lozenges made of hemlock juice proving at times invaluable.

Paroxysmal spasmodic cough yields occasionally to strychnine, and the inhalation of ether or chloroform is useful; but these remedies need much judgment in their administration.

Sometimes the membrane is so dry, and cough so suffocative, that tartar emetic, which promotes a watery flow from the dry surface, gives relief, and there are times, too, when it is impossible to withhold morphia or prussic acid; but these remedies can only be employed under the watchful eye of the skilled physician. It is less our object in this article to speak of these powerful drugs than to urge the value of simpler measures, and to show that these are capable of securing results

quite as real and striking as are to be gained by the powerful poisons which the ignorant are apt to use so blindly and confidently.

To obtain the full benefit, however, from the harmless methods referred to, perseverance is essential. In the early stage of dry, irritable cough, the inhalation of steam — with or without hops or poppy heads — will often, if used for hours, prove a complete cure, but it does, perhaps, more harm than good if used only for a few minutes. Warm drinks or the warm bath may be so taken as to act on the skin and internal membranes as efficiently as tartar emetic, but they must be taken perseveringly; and such is the natural laziness of mankind, and disinclination for troublesome remedial methods, that many would prefer to "take a good dose of antimony and have done with it," rather than coddle in a warm room for half an evening.

Some people are so impatient of the sense of discomfort which precedes cough, that they "hawk" and "clear up" perpetually till the membrane becomes sore and irritable, and cough incessant; while others, of a more placid temperament, manage to bear the discomfort and avoid cough altogether, though the state of throat may have been originally the same in both cases. Gum, tolu, black-currant, or other non-medicinal lozenges may help to allay this kind of discomfort.

Again, one person, with a commencing cough, and with an almost Mohammedan fatalism, will assert that if he has a cough nothing will stop it, and will recklessly expose himself and increase the severity of the affection, while another will go to the opposite extreme and keep in a room so close as to retard recovery and convalescence. Dry, dusty, close, or gas-polluted air, and sudden changes, should be avoided; a respirator held before the mouth and nose while passing a draughty passage is often of service. A cough of recent date may be frequently cured by breathing a warm moist air for a few hours, and, for a cough of long standing, the selection of an appropriate climate is often the best means of cure. The uninterrupted contact of a balmy, healing atmosphere is indeed almost essential for cure in many chronic laryngeal and lung affections.

Tar, which is a capital tonic for the skin, and cures so many cutaneous eruptions, is a good tonic, too, for the inner membranes, and people have lived in an atmosphere impregnated with tar vapor with marked benefit. The turpentine emanations which fill the air in pine woods have had remarkable virtues attributed to them; hence the popularity of Bournemouth and Arcachon.

In the treatment of chest affections, great attention is now rightly given to the choice of climate; and upon this, as well as upon many other points to which we have been unable to allude, we could have wished to enlarge, but we have already overstepped our proper limits, and we would conclude as we began — that cough is a symptom that calls for investigation, and not a disease to be dealt with in a spirit of routine. It is too valuable a servant to be silenced and disregarded: better that our slumbers should be disturbed than that the enemy lurking at our gates should entrench himself in the citadel; let us not poison the watch-dog, but be grateful for the bark which discloses the foe and prepares us to fight him.

Epidemics and Endemics. — According to Dr. Ransome, bronchitis and catarrh are most common in winter, and diarrhœa in summer; rheumatic fever, although rather more frequent in winter than in summer, may come on at any time, but is commonest in autumn. That scarlatina is never entirely absent, and usually is most prevalent in autumn, and least so in dry summer months. Measles is essentially a disease of winter and spring. Whooping-cough, too, is, on the whole, more prevalent in cold than in warm weather. Typhus fever is rare during the frost of winter, and the number of cases is low in early summer.

HOW TO REST THE MIND.

SAID the dying Anquetil to his physicians, "You see a man *dying full of life.*" A New York banker of vigorous physical appearance recently went to Europe for his health. Though to all external appearance perfectly well, he felt that his mind had been overworked, and needed rest. Soon after his return home from Europe, however, he had an attack of apoplexy, occasioned, it seems probable, by a mistake with regard to the *kind* of diversion which he needed. He had exchanged one form of excitement for another, like a man who should take the blower down from his grate and substitute another of a different pattern in its place. It would seem much more advisable in such a case to go into the country, where the mind could be rested by an easy, quiet, *drifting* life.

Mr. Greeley's cabbage garden might not have been a bad investment, after all, even though that attractive vegetable was raised, as he tells us, at an expense of thirteen dollars a head. Agriculture, digging in the dirt, seems to be almost a specific for an overwrought brain.

Dean Swift predicted, as the sequel proved, that he should "die first at the top," for he felt that he was wearing out his brain too fast. It is said that "people is most happy whose annals are tiresome," and doubtless the same is true to some extent with regard to individuals; that life is not always, by any means, the most happy or the most useful that is filled with excitement.

Dr. Carpenter expresses very clearly the principles governing the wear and tear of brain: "Like all other tissues actively concerned in the vital operations, nervous matter is subject to a waste or disintegration, which bears an exact proportion to the activity of its operations. Every idea, every emotion, every act of volition, and every perception, however passive or fleeting, is necessarily attended by a waste and decay of a certain portion of the brain tissue."

In view, therefore, of this constant waste, some attention must be paid to repair, and the method of securing this repair of the mind must be especially adapted to the individual case. We speak of the relaxation of the mind as we do of the relaxation of a muscle; but the latter is a simple organ which may be rested merely by inactivity. The mind, on the other hand, from its complexity, does not respond to such simple treatment. Each individual mind must be studied by itself, and its proper kind of rest selected.

One of the first questions to be asked in regard to mental recruiting is, whether *quiet* or *excitement* is needed. Physicians of large practice need the recreation of rest—the relief of having nothing particular to do for awhile.

In some young ladies' seminaries every portion of the twenty-four hours has some special duty assigned to it. The scholar feels that she is constantly in the harness. To many minds, undoubtedly, this excessive "avarice of time" is injurious. It is very refreshing for a short time every day, and for a few consecutive weeks in the year, to feel that we have no duties awaiting us.

In most cases the taste of the individual will dictate rightly whether quietness or excitement is best for him, but not always. The taste may become morbid, and in some cases extremely so. A gentleman in this State, who has been for many years a successful business man, has recently been so constantly engrossed in business that he is now on the verge of insanity. His extravagant bargains and increasingly irritable temper give certain evidence of approaching mental disease. Still his inclinations leads him to press on still further in the same mad course. Hugh Miller's case was somewhat similar. He felt an irresistible desire to make still greater mental exertions, although he knew perfectly well that such a course would injure him. These are exaggerated cases of morbid taste; but the same evil, less fully developed, is not uncommon. How often it hap-

pens that when exercise in the open air is just what people need to strengthen them, it is the last thing which they desire to do.

There are many pleasure seekers who throng the watering places in search of excitement, when they are already dwarfed in body and mind by their devotion to that species of pleasure. Still they crave it, as a child is always ready to eat more candy. A lady who passes the greater part of the year in the fashionable circles of city life, will be most benefited in the summer by going where the constraints of society may be laid aside. On the other hand, those whose ordinary lives are a monotonous routine of work and care, will be really benefited by a round of excitement and active amusement. If the vacation is a long one, there should certainly be some other object in view than mere enjoyment. This applies to school children and to grown people as well. To be enjoyed, their time must be well occupied.

> "Want of occupation is not rest:
> A mind quite vacant is a mind distressed."

I have heard it remarked that to enjoy a tour in a foreign country one should select some special field of study and observation. In this way there will always be some object in view to give piquancy to the trip. A man with such a purpose will see all the lesser objects of interest quite as well while pursuing his specialty. It is said that if you want to see a star at night that is a little dim, it is best to look on one side of it. So in seeking rest for the mind, it is best not to aim at it too directly. Such a man as Humboldt or Agassiz must receive much more enjoyment from travelling than those who travel merely for pleasure.

In providing a suitable atmosphere for the diseased mind, the physician pays special attention to *occupation* and *companionship*. Chambers says, that "in all the concerns of organic, as of social life, anything is preferable to *stagnation*." This condition is fatal to mental health. The mind must be employed, and the physician should endeavor to furnish the patient with some kind of amusement or employment suited to his capacity.

Suitable companionship is a matter of very great importance. Many patients are made delirious, and some become maniacal, from the officious, inquisitive people who crowd about their bedsides. If the physician prohibits visitors from seeing the patient, he is thought oftentimes to be unnecessarily strict. People do not realize the great harm that is done to the sick by the presence of uncongenial visitors. The case is the same with those who, though not sick, are sufficiently unwell to need recreation. A large and interesting party may be entirely spoiled by one obnoxious member, and all the anticipated recreation frustrated. Mothers who go to places of amusement with crying babies must feel this truth; those sitting near them certainly do.

Discrimination on the part of patients themselves with regard to recreation, is hardly to be expected, but a physician's advice on the subject, it would seem, would be certainly heeded. Hence the subject is not unworthy of attention. Serious mental disease may be often prevented in this way. Insanity is becoming so prevalent in our country that all the causes leading to it should receive careful study. A large proportion of the cases would never receive the sad diagnosis, "insanity," if their mental condition had received early attention.

The problem how to rest the mind, is full of importance in its application to children. Our school system, as at present constituted, is attended with many evils. The children are kept still too long. They are expected to study six hours or more in a day, when grown men find it difficult to do as much, though fully interested in their subjects of study, and gifted with mature minds. It is believed that the ultimate education of youth would be as efficient, both to the individuals themselves and to society, if the children did not begin so young, or study more than half as long.

A bright little girl, with a pale face and undefinable pains all over her body, presents herself to the physician for

treatment. She has been at school since she was six years old, and she is now eleven. Her mother informs him that her child has been little inclined to take any exercise for two or three years past, though previously robust and healthy. She cannot go out to play after coming from school, because she is tired, or has lessons to get. Every little while she has a short illness. She is fond of school and study, is flattered by her teacher, and makes good progress in her lessons. Such a child should leave school at once, and remain away until she is well, notwithstanding the protest of the teacher that she knows more about the child than the doctor does, and it is a shame to take away her best scholar. Not only are weak and delicate children made invalids by this excessive confinement, but those who are strong evidently suffer a loss of stamina.

Now the great difficulty in reducing the number of hours of school is, that the *parents* are unwilling to have it done. They want the children out of the way. For this reason they send them to school at the earliest possible age, and wish them to remain there as many hours in the day as possible. Calisthenics and walking exercises are now quite generally introduced into school-rooms, and every effort is made on the part of the teachers to secure the good health of the pupils. It is the public who need to be aroused to the importance of this subject.

If, then, it be true that a much greater length of time is spent in the schools than is required for mental discipline, could not the surplus time be better utilized in attempts to keep the children alive? If three hours a day will secure the good results that are now accomplished by six, the three hours thus gained might well be devoted to some *manual* employment that will at the same time give the children exercise and teach them useful trades. At all events, it would show them what manual labor is, and would make them feel that it is honorable. But the kid-gloved parents raise their hands in holy horror. It cannot be. They wish their sons to be *gentlemen* and their daughters to be *ladies*. So the question is settled. It is so much the fashion to hold up the professions to youthful aspiration, that any move that should make the trades seem more respectable would certainly be a great advance in our system of popular education. Better far that a mechanic should have merely the rudiments of an education, than that he should have been led to despise the honorable employment by which he earns his honest living.

To combine instruction of this utilitarian character with the ordinary curriculum of study, would hardly be practicable in our city public schools, without an entire revolution in their character. The experiment could, however, be tried in private institutions, or even in public schools in small places where the number of children is small, and the difficulties and expenses of the experiment would be slight. This is by no means a new idea. This method of education is now in full and successful operation in reformatory institutions throughout the country. Agricultural colleges are organized on this plan, and some military schools also may be placed in this category. The boys in these institutions are cheerful and happy, because they are well. There can be little doubt that the best results would follow a similar course of instruction in schools throughout the country.

From an article by Prof. W. H. Lathrop, in "Rev. of Med. and Pharm."

CANCER.—Geologically, the hardest and most elevated rocks are the sites where the least mortality from cancer is found. Along the river courses which flood their banks seasonally are to be found the districts in which the highest mortality takes place; and that whereon, from the nature of the rocks forming the water shed, the floods are much discolored by alluvium, and where, from the flatness of the country, the floods are retained and not easily drained off, there we find the greatest mortality from cancer among females.

Singular Case of Resuscitation. —Dr. Hood relates the following two remarkable cases, which seem to show, he says, that even aged persons are sometimes allowed to die unnecessarily: —"Instances might be quoted of persons who were believed to be dead, but were recovered, and amongst them not the least remarkable was that of a celebrated English baronet who was laid out in his coffin. His old butler volunteered to watch his master's corpse throughout the night; but, most probably thinking the time would hang heavy on him, he invited a friend to share his vigil with him. The butler's only fault, as a servant, was his indulgence in stimulating beverages; and he did not omit, on this occasion, to have recourse to them. As the night wore on, the idea rose in the butler's mind that there would be no harm if he administered to his late master a glass of the brandy he and his companion were engaged in drinking, and he proposed it to his comrade, saying, 'He has been a good master to me for many years, and has given me many a glass, and I will do the same by him before he is taken from our sight.' He did as he said, and poured a glass of brandy down his master's throat, which had the instantaneous effect of recalling him to life, and he survived for many years. A somewhat analogous case occurred in my own practice some years ago. One evening, about eight o'clock, the coachman belonging to Lady C. ran to my house and begged me to come to his mistress directly, for, from what the servants told him, he said she was either dying or dead. The distance was short from my house, and I was speedily there. Lady C. was in her bedroom, sitting in a high-backed chair, and behind it stood a medical man. His first observation to me was, 'Her ladyship is gone,' and indeed she presented all the appearance of death having taken place. Her face was deadly white and cold, her jaw had dropped, but her eyes were closed. I felt her pulse and detected the faintest possible thrill beneath my finger, and I could only compare it to the tension of the finest cambric thread. Lady C.'s daughter-in-law was standing beside me, and I asked her for some brandy, which she immediately ran for and brought. I poured out a large wineglass-full, and poured it over the tongue, and it ran down the throat as readily as if it had been poured into a jug. The moment it had reached the stomach Lady C. revived, gave a spasmodic gasp, and opened her eyes. She speedily regained perfect consciousness, and inquired of me, 'What I did there at that time of the evening?' At this time Lady C. was eighty years old, and she lived for five years afterwards.

Benefits of Laughter.—Probably there is not the remotest corner or little inlet of the minute blood-vessels of the body that does not feel some wavelet from the great convulsion produced by hearty laughter shaking the central man. The blood moves more lively — probably its chemical, electric, or vital condition is distinctly modified — it conveys a different impression to all the organs of the body, as it visits them on that particular mystic journey, when the man is laughing, from what it does at other times. And thus it is that a good laugh lengthens a man's life by conveying a distinct and additional stimulus to the vital forces. The time may come when physicians, attending more closely than they do now to the innumerable subtle influences which the soul exerts upon its tenement of clay, shall prescribe to a torpid patient "so many peals of laughter, to be undergone at such and such a time," just as they now do that far more objectionable prescription — a pill, or an electric or galvanic shock; and shall study the best and most effective method of producing the required effect in each patient.

A man who had committed several murders, and who appeared to be insane, was put under the influence of chloroform. As he began to revive, he answered questions with truth and reason. As soon as complete consciousness was restored, he saw that he had betrayed himself, and made a full confession.

AN ARTIFICIAL PUPIL—WHAT IT IS:

How and Why the Operation is Performed.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

PROBABLY most of my readers have heard of an artificial pupil, as they have heard of an artificial eye; or they have some friend whose eye has a slightly unnatural appearance from having an artificial pupil. An artificial eye is a little shell of glass, imitating the natural eye, and inserted between the lids to conceal the loss of the visual organ. An artificial pupil is quite a different affair. It is an additional pupil made through the iris. Here, as always, we must understand a little anatomy, in order to comprehend our subject, and for this purpose we may use a friend's eye to look at, or our own in a mirror. The colored part of the eye is called the iris. The black round spot in the centre of it is the pupil; which is simply a hole through the iris, as is seen in this little diagram of a section of the human eye (*Fig.* 1). No rays of light can pass into the eye

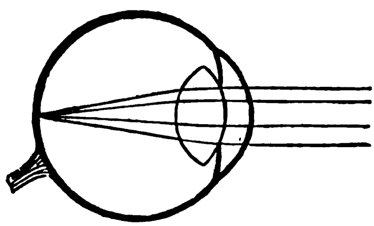


Fig. 1.

to reach the retina except through this hole in the iris. The iris is a thin, delicate, vascular and muscular membrane, covered with black pigment on its posterior surface, and forms a perforated screen or diaphragm like those we have in optical instruments, as the spy-glass or microscope. Notice the size of the pupil when exposed to the light, then cover the eye with your hand for a second or two, and suddenly remove it. You will see the pupil has enlarged, but contracts suddenly again on exposure to light. The muscular contraction and expansion of the iris, therefore, serves to regulate the amount of light admitted to the eye, and adapts it to the ever-varying amount it is constantly exposed to. Now this vascular and muscular diaphragm, the iris, is very frequently the seat of inflammation, due to a variety of causes. When it is inflamed there is a secretion from its surface called lymph, which fills up the pupil and is finally organized into a whitish and opaque membrane, entirely preventing the light from passing through the pupil to reach the retina. If you look at the diagram (*fig.* 1), you will see that the pupillary edge

of the iris rests against the anterior surface of a double convex lens, the crystalline lens. If there is inflammation the iris is liable to be fastened down to this lens, and cannot, therefore, dilate or contract, and its attempt so to do with the varying intensity of the light, will aggravate the inflammation by dragging the tissue of the iris. For this reason, the moment the ophthalmic surgeon finds there is trouble with the iris — a fact which he knows by various symptoms — he applies a solution of atropine to the eye. Atropine, by dilating the pupil and keeping it so for several days, as well as being of other special service, thus prevents the iris from attaching itself to the lens, or the little capsule in which the lens is held. It is therefore an invaluable remedy as applied to the eye, but a powerful poison when internally used in too large doses.

Supposing now the pupil is blocked up by a mass of opaque and tough lymph, rendering the patient quite blind, what can be done to give him sight again? The surgeon simply makes a hole through the iris at some other point, and the patient can see through *it* nearly as well as he could through his natural pupil. The various methods of performing this operation I need not, of course, dwell on here.

The clear part of the eye in front looking like a watch-glass, may, from disease, ulceration, injury by burn or scratch or cut, become quite opaque, forming a large white spot, often called a *pearl* by the community. When this opaque spot is situated in front of the pupil, the patient will of course be unable to see through it, and proportionately blind. Now, if we remove a piece of the iris and thus make an artificial pupil somewhere else, behind a *transparent* portion of the cornea, then the rays of light can again enter the eye and go to the retina, and sight will be restored; a delicate but successful operation. (*Fig.* 2.)

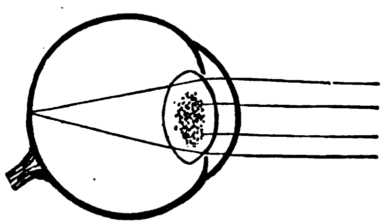


Fig. 2.

Again, in *fig.* 2 we see the centre of the crystalline lens opaque with cataract, of a character frequently congenital. This stops the rays of light so they cannot reach the retina. The pupil has, however, been widely dilated with atropine, and we notice the rays of light can pass through the outer clear portion of the lens. We can-

not, however, keep the pupil always dilated with atropine, and even if we did we should have a circular pupil not serviceable for good vision. The surgeon therefore removes a small piece of the iris, or makes a slit in it over the clear part of the lens, and useful vision is obtained for the patient.

The cornea sometimes loses its natural curve, and becomes conical in shape. This excessive convexity is found generally in the centre, directly, therefore, in front of the pupil, and it may so interfere with sight as to oblige us to form an artificial pupil away from the central part of the cornea, where the curve is not so great. The operation also has a definite action in retarding the gradual giving way of the cornea, and its further bulging.

All these cases I have so far mentioned are where we desire to avoid the excessive curvature of the cornea, or simply wish to let the light through a clear space into the eye to reach the retina. An artificial pupil, however, is much more frequently made for a very different purpose, and the operation is then called an *iridectomy*. This is an invention of the late lamented Prof. Græfe, of Berlin, Prussia. He found that the removal of about one-sixth of the iris, carefully carried up to the outer edge or junction of the iris with the external coating of the eye, so as to leave a pupil of the shape in the adjoining cut, was a very powerful prophylactic remedy in very many affections of the eyeball and its membranes. (*Fig.* 3.) One of the ways this truly wonderful operation of iridec-

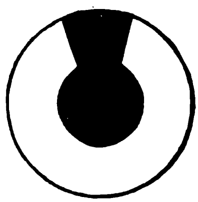


Fig. 3.

tomy acts, is to decrease the pressure of the humors in the eye when they are secreted in too great quantities, so as to render the eyeball tense and hard, and thus cause pressure on the nerves within the globe, thereby producing, perhaps, sudden blindness. The several affections of the eye in which iridectomy has been found to be valuable, are very numerous. When the cornea is injured or diseased, and softened by ulceration, iridectomy may prevent its bursting, and thus save the eye. When an ulcer has made a hole through the cornea, or a wound has left an opening in it causing what is called a fistula, then the aqueous humor constantly flows off through this

hole, and the lens forces the iris up against the cornea, preventing the fistula from healing up. Here an iridectomy, properly done, changes the whole condition, and gives opportunity for nature to repair the damage. I said that when the cornea bulged too much in the centre, we made a pupil at one side. Now when the cornea is gradually giving way from pressure of the fluids inside, no matter where the point of enlargement may be, or from whatever causes, softening from ulceration or otherwise, then an iridectomy, well performed, prevents or arrests further bulging, by reducing the pressure on the inside of the eyeball. So also if there is a bulging, or *staphyloma*, as it is called, of the globe, beyond the clear part or cornea, *i. e.*, of the white of the eye, no matter whether it has originated from constitutional causes or some remote injury to the eye, then a well-timed iridectomy may arrest the trouble and prevent imminent blindness, probably, by reducing the intraocular pressure.

When by any injury, such as the puncture of a knife, needle, fork, etc., the crystalline lens has become wounded, it is apt to swell up and cause pressure on the iris, and very great pain and danger. Here also we perform iridectomy, removing the piece of iris so pressed on. In the present operation for the extraction of cataract, we always make an iridectomy before removing the opaque lens, whereby we avoid the dangerous pressure on the iris, or its being torn whilst the cataract is pressed out of the opening we have made in the eyeball. Again, the crystalline lens, when by a blow on the eye, or a jar, a thrust, etc., it is dislocated from its position, may cause this dangerous form of intraocular pressure and hardness of the eyeball, which can be relieved only by an iridectomy, or removal of about one-sixth of the iris.

There are certain forms of inflammation of the iris which resist all the remedies which ordinarily subdue such painful and dangerous affections. Here it has also been found that an iridectomy is of great assistance; in fact, often our last and only means of checking a disease fatal to sight. When there is chronic or acute inflammation of the iris, together with that of the membrane inside of the eye, called the choroid coat, which is also very vascular, like the iris, then a proper removal of a part of the iris, an iridectomy, may stay the disease and enable nature to repair, in part or whole, the mischief.

One of the most insidious forms of disease the eye is subject to is what has been called *sympathetic inflammation*. That is, an injured or diseased eye, no matter how or from whatever cause, may at any time, perhaps years afterwards, bring on inflammation in its fellow eye, till then quite sound and healthy. This form of trouble

is very much dreaded by the ophthalmic surgeon for his patient, as the symptoms are not often at first pronounced enough to cause the latter to apply for advice at a sufficiently early period, when a timely and judicious iridectomy might save sight in the eye. But this can never, of course, take the place of the necessary removal, by what is called enucleation, of the other injured and now useless as well as hurtful eye. We always remove the eye that has been hurt, and perhaps perform iridectomy, in addition, on the other.

Possibly one of my readers may have read, or heard of, or seen, some unfortunate person, who having had sudden and acute pain in the eyeball, with rapidly diminishing sight, has become almost or totally blind within twenty-four, or even twelve hours. At any rate such a thing is possible, and only too fearfully frequent. Apart, of course, from any injury to the eye, there is but one disease which can produce such sudden blindness, and till within about fourteen years this terrible disease always caused the loss of sight. The affection which I mean received, a great while ago, the name of *glaucoma*, a word derived from the Latin *glaucus*, or green, because the pupil of the eye presented a greenish yellow appearance instead of its natural jet black color. As I have said, twelve hours may be time enough for this disease to render its unfortunate victim totally blind, but it may also assume a chronic form, and be months or years in producing the same result, or a comparatively slight acute attack may be followed by insidious chronic exacerbations. This is an affection so fatal to sight, and now, as we shall soon see, so amenable to proper treatment, that I pause here to speak of some of the symptoms accompanying it, in order that any of my readers so unfortunate as to be attacked, may perhaps be thus enabled to recognize the disease, and seek at once for proper treatment from the nearest ophthalmic surgeon who is able to afford it. Let them, however, remember that this will assuredly not be obtained from any one who advertises in any shape, manner or form, by newspaper, circular, handbill or card. In this country the charlatan has perfect liberty to advertise, and absolute legal power to fleece his victims.

The symptoms of this disease, glaucoma, are first an increased tension of the eyeball, either intermittent or constant. This is a very important and very definite symptom, and one which points to immediate operation. Another symptom is, of course when the disease is chronic, a rapid increase of old sight; I mean a person requires stronger and stronger glasses within a few months. Besides these signs, the humors of the eye, the aqueous and the vitreous, become cloudy or hazy. The pupil is dilated, and very slowly contracts

when a strong light is brought to bear upon the eye. The patient also has now and then indistinct vision, all objects appearing clouded or veiled. He also may see a halo or rainbow around the candle. He has pains more or less acute in the forehead, temples, and down the side of the nose. The field of vision is contracted, he cannot see plainly over as large a space in front of him as previously. Of course, in an acute attack of one day's duration, all these symptoms are condensed into much less time, and the poor victim will principally complain of the fearful pain, as if his eyeball would burst, very likely having detected that it was as hard as a marble to the touch, and very tender. In 1851, Prof. Helmholz invented the peculiar mirror to be described in a future article, called the ophthalmoscope, by means of which we are enabled to examine most minutely the interior of the human eye. By means of this instrument my friend and instructor, Prof. Edward Jäger, of Vienna, had, in 1853, noticed the very peculiar appearance of the optic nerve in the eye during this disease, glaucoma. Prof. Græfe, of Berlin, followed out this, and with masterly skill connected the various symptoms and morbid appearances, finally deducing the fatal effect of glaucoma to be due to the increased intraocular pressure as shown by the tension of the eyeball, and discovered one of the most brilliant results of modern surgery; namely, that an artificial pupil, or excision of a piece of the iris, an *iridectomy*, relieved this pressure within the eye, and saved the patient from blindness.

As may be naturally supposed, before the invention of iridectomy for glaucoma patients suffering from this disease were treated in various ways, and often very heroically, since they naturally demanded some relief from fearful pain, no matter how obtained. Leeches, mercurials, antiphlogistics, diuretics, diaphoretics, cathartics, etc., etc., in the way of medicines, and puncture of the eyeball in the way of surgery, all were of no avail, and but few of them readily used in a disease sometimes running its course in perhaps four-and-twenty hours. Therefore, the brilliant success of timely iridectomy for a person suffering agony all night and stone blind in the morning, by relieving the pain at once and entirely, and permanently restoring useful vision, can hardly be thoroughly appreciated except by the unfortunate patients, and those who have had the happiness to have thus befriended them. Other operations have been devised, and carried out to relieve glaucoma, but none compare with iridectomy. It is a curious fact that the more sudden and severe the attack, the more sure and permanent is the relief by this operation. This fearful disease, glaucoma, may attack one eye directly after the other, and

therefore both patient and surgeon must be prepared, the former to submit to, and the latter to carry out a second operation on the other eye. The patient must never be allowed to go away out of reach of immediate surgical aid, till some time has elapsed. I trust I have thus taught my readers a little about a serious malady affecting principally the middle-aged and old people, and also, I hope, induced them to have a still greater respect for modern science, and those availing themselves of it honestly and diligently in relieving suffering, and promoting human welfare and happiness.

I suppose now my readers have a sort of curiosity to learn just how the ophthalmic surgeon makes an artificial pupil, or performs an iridectomy. With a lance-shaped, delicate, flat knife, he pierces the eye in front of the iris, then passes in a pair of very fine forceps through the wound, grasps the iris with them, and drawing it out, snips it off with small, sharp scissors. Of course such an operation, although sounding so simple, is in reality a very delicate one, requiring skill and experience on the part of the surgeon.

It is a maxim of surgery never to operate unnecessarily, but never to hesitate to operate. Moreover, we always strive to find and carry out less severe and equally useful operations, an instance of which is here directly in place. I said above that the pupillary edge of the iris rested against the crystalline lens, so that when adhesive inflammation took place in the iris it was liable to be fastened down by little tags, as it were, to the lens, or rather its capsule. These little cuts represent three such cases drawn from nature. The pupils are not dilated evenly and round by the atropine put in the eye, the adhesions preventing it. (*Figs.* 4–6.) Now these attachments, by

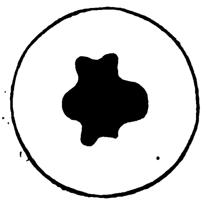


Fig. 4.

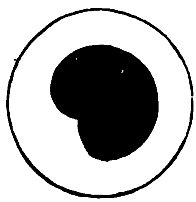


Fig. 5.

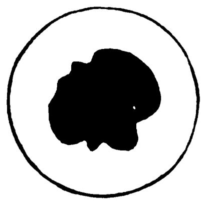


Fig. 6.

dragging on the iris, are the fruitful source of repeated attacks of inflammation, and attempts have been made to separate them, and with some success, but not enough to warrant continuing the operation. If these tags were many, and the pupil small, and filled also, perhaps, by more or less opaque membrane, then we had formerly no other method of treatment than the making an artificial pupil through another part of the iris, or an iridectomy was performed,

embracing as many of the tags as possible in the portion of iris removed, to counteract the recurrent attacks of inflammation of this membrane. A German physician, Dr. Passavant by name, has within two years discovered that these attachments may be broken up by making a small opening in the cornea, and through it, with very delicate forceps grasping the iris gently, and pulling on it till the attachment breaks away. This, of course, has to be done for each, or nearly each attachment. It is found to produce very little irritation of the eye, and to finally leave the pupil round, and the iris free to contract and expand without danger of irritation. All these cases above were thus operated on with perfect success, and this operation is now regarded as a great advance in ophthalmic surgery, since we are thereby enabled to restore the eye to its natural condition with much less operative interference, which every true surgeon always strives for. These delicate operations we have thus described in this article, are of course rarely if ever attempted by advertising licensed charlatans. They avoid them for evident reasons, and generally succeed in obtaining what they want—namely, their clients' hard-earned money—by persuading them to *pay so much down*, or so much a month, or to purchase vast amounts of useless or hurtful drugs. This the law allows, and protects them in doing, whilst the people are the lawgivers.

SNAKEBITE MORTALITY IN INDIA.—It appears that 11,416 lives were lost last year from this cause, of whom 4,146 were men of adult age. Of these deaths 2,690 are known to have been caused by bites of the cobra; and in nearly 7,000 cases the species of snake was unknown; but, from the proportion of deaths caused by the cobra, it may be assumed that, altogether, at least 5,000 deaths result from the existence of this snake alone.

This terrible mortality indicates a proportion of one death to every ten thousand of the population, and shows that snakebite is one of the most frequent causes of death in India.

TEACHING OF DENTAL SURGERY.—While Americans of culture, to finish their education, usually go to the Universities of Europe, in the specialty of dentistry the current is reversed, the graduates of the highest medical schools abroad coming to the United States, and chiefly to Philadelphia, to finish their dental education. There are in the United States nine dental schools, two being in Philadelphia, two at Boston, and one each at New York, New Orleans, Baltimore, St. Louis, and Cincinnati. Two-thirds of all the students attend the two colleges in Philadelphia, of which the "Philadelphia Dental College" is the chief, and it is noticed that about one-fourth of the students at this college are generally from abroad, nearly every country in Europe being represented. Of the high distinction of having graduates from the Universities of London, Vienna, and Berlin, to finish their dental education, the Philadelphians are quite proud, as they also are of the fact that their city contains the most extensive manufactory of dental instruments and artificial teeth in this country, if not in the world.

ON THE SCIENCE OF SLEEP.

FROM ancient times sleep has been regarded by philosophers and students of nature with the deepest interest. It is, therefore, the more remarkable that until very recently one of the most important questions in connection with the theme — namely, the cause of sleep and the reason of its periodical return, has been but very imperfectly answered. Two years ago Professor Pettenkofer, of Munich, a gentleman widely celebrated for his researches into the cause of cholera, in the course of his experiments upon the exchange of gases in the human system, gave a perfectly satisfactory reply to the inquiry.

It has long been known that the oxygen taken in during the act of breathing plays a very important part, inasmuch as through its union with the substance of our bodies the vital forces are generated. In every process of life, however insignificant, a certain quantity of oxygen is consumed. It is, in a sense, the steam power by which the living machine is driven, and the amount used can be measured by the quantity of carbonic acid generated and set free in the act of expiration. For this purpose Pettenkofer, assisted by Voit, has contrived an apparatus, and has thereby brought to light the unexpected fact that during the day, even with the slightest efforts, we give forth proportionately much more carbonic acid, or, in other words, consume much more oxygen than we receive during the same period.

From this interesting fact there naturally arises the important inquiry, by what means is this daily deficiency supplied? Here, also, Pettenkofer's researches furnish us with a satisfactory answer. Sleep is the prudent minister of finance, who every night, by a wise economy, makes up the losses of the day, for in sleep we not only consume half as much less oxygen as we do in the day, but we take in twice as much as we do when we are awake. During sleep we lay up a store of oxygen, which enables us without fear to look forward to the deficiency of to-morrow. Is not this arrangement truly worthy of our warmest admiration? Many a state might congratulate itself if its financial administration were conducted on similar principles. Once more we find that nature is the best teacher, giving us a lesson in national economy from the philosophy of sleep.

We have laid down the principle that in every process of life, no matter how trifling it may seem, we consume a certain proportion of oxygen. Every motion, every sensation, even every thought is such a process. If we shake hands with a friend, if we look at him, or affectionately think of him, our heart beating quicker at the thought, we suffer the loss of a definite quantity of oxygen; a certain portion of our body is consumed and changed into carbonic acid. All this sounds horribly material, but it is, nevertheless, perfectly true, and is sustained by the best possible proofs — namely, those arising from the economy of the human system. During sleep its task is to be sparing of oxygen, and like a wise householder, who avoids all useless and luxurious indulgence, and limits himself to such expenditure as is necessary for his subsistence, it faithfully performs it.

But what are these things which we may regard as the luxurious expenditure of our organism? Above all we must include in this category the whole range of the activity of the senses, since such activity is not indispensably necessary for the maintenance of life. In sleep we may strike off with comfort the charges connected with sight. The muscles of the eyes first refuse their service. A peculiar feeling of pressure and heaviness in the upper eyelids informs us that they are preparing for sleep, and the impossibility of fixing the eye steadily upon any object, betrays to us the fact that the muscles, which cause the convergence of the axis of sight, can no longer perform their part. With the closing of the eyelids the excitement of the retina ceases, and the nerves of the eye sink into repose.

The next organs which cease their activity during the process of falling asleep are the ears. Possessing no closing apparatus like the eyes, they do not so easily enter into a state of rest. Here, so to speak, sleep has to struggle for its rights. The best example of this we may find in our own experience, if we have been so unfortunate, or shall I say fortunate, as to fall asleep under a tedious lecture or sermon. After we have gradually lost the thread of the discourse, and our eyes are enjoying their well-earned rest, the words still continue to sound in our ears, but we are no longer in a condition to recognize and understand them. Gradually they become more confused, and at length end in a dull and inarticulate murmur, which seems to withdraw itself farther and farther from us, until at last it is entirely lost.

In the meantime the sensitiveness of the skin begins to be lessened. In vain our friendly neighbor wearies himself to save us from the annoyance of falling asleep by gently pushing us and treading upon our toes. All his efforts fail. Sensation, if not altogether lost, is so materially lowered that it will respond only to strong provocation. The senses of smell and taste cease their activity, and so at length we are pretty well relieved of all our five senses.

At last the muscles, controlled by the will, sleep also. When we sleep in a comfortable bed we are hardly conscious of this, and the best opportunity for observing it is when, wearied by an uninteresting discourse, we must sleep sitting. Who has not been grieved to find the impertinent muscles of his neck suddenly refusing to carry his head upright? And as long as the struggle between sleeping and waking is continued, there is exhibited to the mischievous spectator the highly amusing but treacherous nodding of the head.

Thus the body has, like a frugal housekeeper, discharged its obligations, and unsparingly reduced all expenditure for mere pleasure and luxury. But this is not enough; it materially curtails the charges for the nourishment of its tissues and the renewal of its substance. The action of the heart is diminished to a speed varying from three to ten strokes; the blood comes less often into contact with the general structure, and, therefore, imparts to it less oxygen.

RICE.

THE use of rice as a breadstuff is probably coeval with the human race. Like that of the other cereals, it extends beyond the reach of record. Under the name of *oruz* in Arabic, *oruza* in Greek, *oryza* in Latin, *riz* in French, *reis* in German, and *rice* in English, — it has been known to history for two or three thousand years, being mentioned by Theophrastus twenty-two hundred years ago, and by Horace, Pliny, and Celsus at a later date.

Its native place is probably the steaming river bottoms of India, whence it travelled eastward and northward to China and Japan, and westward to Egypt and to us. When it reached Egypt we know not; early enough, however, as many think, to give rise to that singular exhortation of the royal preacher of Israel, twenty-eight hundred years ago, in which, alluding probably to the mode of sowing rice on the swollen surface of the Nile, he says, "Cast thy bread upon the (face of the) waters; for thou shalt find it after many days."—Eccles. xi., 1.

After being introduced into Italy from Greece, as we learn by the form of the name, and being domesticated for centuries in all the southern countries of Europe, it was carried, in the year 1695, to the then infant colony of Carolina; where it was soon cultivated to such extent, and brought to so high a degree of perfection, that the rice raised upon the southern seaboard of the then American colonies, has been ever since known in Europe as Carolina rice.

As an article of food it surpasses in importance every cereal in present use. Wheat may be more nutritious, rye more hardy, maize spread over a wider range of temperature — but rice feeds the greatest number of human mouths. Among the swarming millions of the tropics, and of China, it occupies the same place as wheat in the warmer parts of the temperate zone, and rye in the colder. It has been estimated that, if the human race were divided into families according to the predominant use of the several grains, the rice-eaters would occupy the first place in number; while wheat and maize would contend for the second, with a fair promise of victory to the maize; and the fourth place would be held by rye, oats, and barley. Indeed, besides being the "staff of life" in the most populous parts of the earth, it is now so extensively used among all the other grain-eaters of the race, that it is questionable whether a greater amount of it is not consumed as a breadstuff than of all the other cereals combined

Its Characteristics. — Among botanists it is known by its Latin name *Oryza*, of the class Hexandria, and order Digynia. There is but one species, though there are many varieties; for the wild rice, so called, of the North American ponds and lakes, is not a rice, but a reed — not an *oryza*, but a *zizania*.

Food chemists tell us that it contains "less of the nutritive principle than wheat." This, however, is in some measure compensated by the fact that of all the cereals it is the most compact — a merchantable bushel of maize, or Indian corn, being rated at 56 lbs., and wheat at 60 lbs., while rice, which rarely sells by bulk and therefore has no established standard like the others, seldom weighs less than 65 lbs. to the bushel, and oftentimes more. Its compactness is shown also in its resistance to being crushed, having almost a gravel-like hardness; and also in the fact that skilful boiling will cause it to expand and double — perhaps treble — its former bulk.

But, however weighty in the scales, it is exceedingly light upon the stomach. In general wholesomeness, in delicacy of flavor, and in the variety of uses to which it is applicable, it is probably not surpassed by any other grain. To the strong stomach of the day laborer it is as well suited as the coarse bread of the Indian corn, rye, or oats; while for the delicate appetite of the invalid, or for the tender organs of the babe, it is a safe substitute for sago, arrowroot, tapioca, or cassava.

Its Varieties. — What is known in England as the Cargo rice is a Bengalese variety, having a reddish cast, and rather coarse looking. The unusual size and sweetness of the grain, however, cause it to be esteemed by the Hindoos above all other kinds.

The red rice oftentimes seen in American shipments, scattered among the white grains, is not a distinct variety, like that of the Bengalese, but is the result of careless cultivation. Seeds of the whitest kinds, allowed to fall into the earth at harvest, and to lie there all the winter, will mature the next year into red rice. Its presence is regarded as a blemish.

The small variety known as the Patna, and remarkable for the slenderness and whiteness of its grain, is no doubt the best known and most highly esteemed in Europe of all the eastern importations.

The Carolina rice, acknowledged to be the best in the world, is cultivated in its greatest perfection at Wacamaw, near Georgetown, South Carolina, and on the Savannah and Altamaha rivers; but can be produced in equal perfection along the tidewaters of the Floridas, as well as of Carolina and Georgia.

Of the many sub-varieties in favor with Amercian rice planters, the two most highly prized are the white and the golden, so called from the color of their chaff. Both kinds produce abundant crops, and turn out beautiful grains; but the white is preferred by some planters as being more prolific, and better suited to a highland or semi-highland culture; and the golden is preferred by others as better suited to tidewater culture, and as furnishing more pearly grain.

Its Culture. — Were an opinion formed only after inspecting the larger and more costly rice fields of the regions just mentioned, it might be supposed that no one need attempt the culture of rice who had not at his command a princely fortune and a boundless supply of fresh water; with grounds as level as a floor, and rich as the bottoms of Egypt. But this would be a mistake. In small crops, sufficient for ordinary family use, rice is easily cultivated, and with little outlay of money or of labor. In every part of Carolina and Georgia, from the seaboard to the mountains, are to be seen, now and then, little patches of it, only a few rods in extent, belonging to farmers of small means, or to negroes of no means at all.

A note made years ago, and lying now before the writer's eye, says with much truth: — "*Rice.* — Few crops more easy; can be raised on any soil that can be made either wet or rich. Usual yield, from 30 to 60 bushels to the acre. Easy crop for poor man, lazy man, any man."

The great pre-requisite to its successful culture, on any scale, is a genial temperature. In large crops, another pre-requisite, for reasons to be given, is a level bottom, with backwater sufficient for repeated overflowings. On a small scale, however, and for a limited time, this repeated overflowing is not necessary. It is not unusual in the rice-growing States to see those little patches, mentioned a few sentences back, cultivated in the midst of a cotton field, where the black soil, indicative of a previously-existing pond, is more favorable to rice than to cotton. In such cases the furrows of cotton stop at the edge of the black soil, and begin again as soon as it is overpassed. The cultivation of the rice, in the short pieces of furrow given up to it, is of course the same as the cotton, and that is the same as most other highland plants. It is but right, however, to say that, in such cases, the rice is substituted for cotton, not because it is a crop of more general value, but because on such soils the cotton produced will be of a blue cast, and of inferior quality.

All wet, spongy bottoms can be successfully used for a few years in the cultivation of rice; but after that time the soil is usually overrun by a vigorous grass, which can only be subdued by an overflow of water.

It is mainly this last-named evil, the prevalence of interfering grasses, which makes the cultivation by water so imperative to the rice-planter. An overflow kills the grass, while it fertilizes the soil, and more than doubles the yield. At the same time, the furrows being nearer together than is allowable for the passage of plough or hoe, the yield is by this means also increased, so that the product of wet culture is found to be very much greater than that of the dry.

In wet culture, the first care of the planter is to secure sufficient and reliable irrigation at proper seasons. This is accomplished by either of two modes. One is by damming the waters of a stream, so as to create a higher level than the field; the other is by reclaiming and dyking land, the surface of which is lower than the level of high-tide water, in fresh water rivers. It is an interesting fact in philosophy, and one of prime importance to the rice-planter, that sea water and fresh water are very reluctant to mingle. They may sometimes be seen flowing side by side for miles, distinctly marked by their several colors; and, what is still more important, the sea water, being the heavier, claims the bottom of the river as its right, and thus by its under-current lifts the fresh water to the surface, where it is needed for admission to the fields.

The next care of the planter is to have the ground reduced to so perfect a level that a small quantity of water shall evenly cover a large area.

His third care is about drainage. To effect this he must construct, around and through his fields, a system of canals and ditches. The larger of these, varying in depth from five to ten feet, and in width from ten to thirty feet, and supplied at suitable points with water-tight trunks and gates, are

intended for admitting the water to the fields, or drawing it off. From these large canals diverge others of perhaps half their dimensions, with a depth of from four to six feet, inclusive of the dam. And from these canals of second size proceeds a system of small ditches or drains, without banks, all over the field in parallel lines, about fifty feet apart, having a depth and width varying from 1½ to 3 feet.

On the levels thus prepared, the seed is sown in shallow drills, about fourteen inches apart, and covered with a wooden hoe. It is then buried under a thin stratum of water until it germinates, and afterwards treated by a system of rules which cannot now be given.

A Pleasant Remedy for Sea-Sickness.—There have been many suggestions made as to the prevention of sea-sickness, none of which have, to say the least, been found in practice to be completely successful. The introduction into practice of hydrate of chloral, which produces with certainty sleep for a definite number of hours, has suggested a means of mitigating the horrors of sea-sickness. An ordinary dose of hydrate of chloral produces sleep usually in a quarter of an hour, and with almost unfailing certainty. Some cases just published by Dr. Doring, of Vienna, seem to show that the value of hydrate of chloral to obviate sea-sickness is very great. It produces quiet and prolonged sleep. In all the instances recorded it seems to have been of great value, even during prolonged sea voyages, giving a good night's rest, arresting violent sickness when it had set in, and stopping the tendency to its recurrence.

Climate of Algeria. — According to Dr. Henry Bennett, Algeria comprehends a country of four hundred miles long from east to west, and some one hundred and twenty miles from north to south, where Sahara commences. None of the mountains are more than seven thousand feet high. There seems to be only thirty days of wind blowing from the desert annually; during the rest of the days of the year a moist sea-breeze blows. Six-sevenths of the rain falls in the winter season, and as much as forty cubic inches fall in the year. Thus Algeria is a very moist climate in winter. The valleys and mountains have a luxuriant vegetation. The climate is rigorous in winter in many parts, but Algiers town seems of mild climate. Algeria is thus, on the whole, a mild and moist climate, not suitable for patients with tendency to phthisis pulmonalis. The east coast of Spain is dry and warm; only fourteen inches of rain-fall in that district, and it is better suited for such invalids. Idiopathic asthma and neuralgic cases, he thinks, might be benefited by living in Algeria.

The Prussian Ambulance Corps and Krankentrager.—In the German army these consist of sergeants, hospital orderlies or nurses, and bearers. They are instructed how to handle men according to the nature of their injuries, to apply the tourniquet, bandages, and splints on the field, and how to place the wounded on the stretchers in the railway carriages, for which proper slings and spring stretchers are provided. The sick-bearers are divided into two sections, one for the field hospital, the other for the field-bearers. They are accompanied by ambulance wagons, a detachment wagon, and one hospital equipment cart. At the order given, the first section run from the equipment cart with stretchers, splints, bandages, etc., to the wounded. Each receive the primary dressing at the hands of the bearers, and are then placed on a stretcher to be wheeled or carried to the surgeon, whose post is at a point called the First Line of Surgical Assistance. After examination they are conveyed to the ambulance wagon, and, if necessary, still further to the rear. Next, when it is supposed that all the stretchers are occupied, a section of bearers advance without them, and carry the wounded carefully, according to the nature of their injuries, as best they can, with belts, blankets, rifles, or in their arms, to the surgeon.

ARTIFICIAL TEETH.

MOST of us are accustomed to regard artificial teeth as wholly a thing of the present day, but such is not the case. Of the wisdom of the ancient Egyptians a knowledge of dentistry formed a part, and mummies have been found with wooden and ivory teeth; some of them even fixed, in modern fashion, on gold plates; and with hollow teeth stopped with gold — so true is it that there is nothing new under the sun. The classic writers also speak of artificial teeth as being well known both in ancient Greece and Rome. A century and a half ago, as appears from advertisements in old newspapers, goldsmiths did the work of dentists in making and cleaning artificial teeth. A few months since, while some excavations were being made at Murcia, in Spain, the workmen came upon human bones; in one of the jaws of which was a silver tooth — this fact was observed by a friend of the writer's, who happened to be on the spot.

But since dentistry has been recognized as a separate branch of surgery in modern times, the precious metals have not been used for the actual teeth. Ivory was one of the earliest substances employed; it was easily shaped, and when first put in, matched tolerably for color with the natural teeth; but from its porous nature it was soon saturated with the fluids of the mouth, and underwent chemical changes, which rendered the breath offensive; its appearance became dark and disgusting, and it rapidly decayed. The tooth of the hippopotamus, being harder and covered with a fine enamel, promised better, and was regarded with favor for a time; but it was found to have the same disadvantages as ivory. The teeth of domestic animals, cows and sheep, have been used, but these would not do in many cases, and only for front and canine teeth. Among the old materials, nothing was better than the crowns of human teeth, mounted an artificial bases. These in a healthy mouth would often wear for from eight to twelve years; but there was much difficulty in procuring a supply, which rendered them costly, and many persons had a horror of wearing dead men's teeth in their mouths. A great stride was made in the art when mineral teeth were introduced. Porcelain teeth are a French invention; they were first made at Paris, about 1820, and have now superseded all others. Unlike those we have mentioned, they are cleanly, since as they are not porous they do not absorb secretions; they are not acted on by the chemical agents in the mouth; they never change color; and as they can be more nicely fitted, they can be worn with greater ease and convenience.

Artificial teeth are sometimes fixed upon the natural roots, when they are free from disease, but only in the case of front teeth of the upper jaw. A better way is by attaching them to a plate of gold or platina, which is secured to the adjoining teeth; this admits of readily taking out for the purpose of cleaning — a point of great importance. When there were no teeth to which they could be attached, spiral springs were sometimes introduced, which pressed against the cheeks, and thus held the plate in place; but these were very uncomfortable to the wearer, and continually liable to get out of order. Some years since, a method of securing the plate by atmospheric pressure was invented, which does away with the necessity of springs, and their attendant disadvantages. This plate is so accurately fitted to the irregularities of the palate that no air intervenes, consequently it remains firmly attached, on the same principle that a leather sucker adheres to a stone. To obtain an exact *facsimile* of the mouth, the dentist presses a soft and plastic composition against the gums and palate, which gives an

exact impression in reverse of the form of the mouth; from this a model in plaster is taken, which is again cast in metal, and dies made, between which a thin gold plate is hammered and fitted, until it takes the exact form of the mouth and accurately fits the gums, palate, and the remaining natural teeth. The most delicate manipulation is required in taking a perfect impression of the mouth in the first place, and the most careful workmanship in the mechanical fitting of the plate is absolutely necessary, in order to insure a perfect fit, upon which depend comfort and correct articulation. This plate is now tried in the mouth, with wax placed upon it to receive the impression of the teeth of the opposite jaw; and the depth to which their marks penetrate indicates the length required for the artificial teeth, that they may exactly meet them. The best material for the plate is gold, but alloys are used, and sometimes other bases are substituted. Platina is also considered well adapted. For cheap sets of teeth, cheaper materials are employed, generally, under different names, vulcanized india-rubber (that is, india-rubber with which sulphur is mixed). Gutta-percha has also been used, but it does not resist the acids of the mouth well. Artificial teeth, exactly corresponding in color and shape to the remaining natural teeth, are now carefully fitted to the plate; and so well is the imitation carried out by first-rate dentists, that it is almost impossible to distinguish the one from the other — the real from the false.

There is another method of fixing called the continuous gum; it consists of an artificial gum, in which the teeth are embedded, and which is made of a somewhat similar composition to that of the teeth, but more flexible; this fits over the real gum, and is colored to resemble it.

Many people who are desirous of having artificial teeth are deterred from visiting the dentist, by the fear of pain and the natural dread of an operation.

For stopping hollow teeth, the only unobjectionable substance is sponge gold, which is a chemical preparation of fine gold. Tin-foil, from its malleability, is easily inserted, but it soon oxidizes and destroys the color of the tooth. A mineral amalgam is commonly used, which is made of mercury, silver, and tin.

To those who have lost their teeth, the advantages of replacing them by good and well-fitted artificial ones cannot be doubted; of these mere appearance is the least, though neither that nor their power for restoring distinct enunciation is to be despised; but without complete mastication, good digestion is impossible, and they are therefore an important means of preserving health. The cause why so many artificial teeth prove failures lies in the desire for cheapness, which too often renders good materials and good workmanship impossible.

In the management of artificial teeth the great point of importance is to keep them clean, as it is, indeed, in that of natural teeth. To all who have sound teeth, and would avoid the necessity for artificial ones, the practice of some of the high caste Brahmins of India is commended for consideration, though scarcely, perhaps, for imitation. They spend an hour each morning cleaning the teeth with a twig, and recite certain prayers at intervals.

EARLY HISTORY OF SURGEONS.

THERE was a time when the profession of a surgeon and that of a barber went hand in hand. By a charter of Edward IV. "the barbers practising surgery" in the metropolis were legally incorporated as "The Company of the barbers in London." Their authority extended to the right of examining all instruments and remedies, and of bringing actions against those who practised ignorantly and illegally. The friends of competitive examination will also be glad to learn that even so far back as the first of

Edward IV., there were examinations for surgical candidates by the masters of the company. But the first association had too much of the barber element in it. Many persons practised surgery without its leave, and at last an association, which styled itself "The Surgeons of London," was formed at the beginning of Henry VIII.'s reign.

In the third year of that monarch it was enacted that no person within the city of London, or within seven miles of the same, should practise surgery unless he were "first examined and admitted by the Bishop of London or the Dean of St. Paul's," having "other expert persons in that faculty" as their assessors. In these associations it will be observed that surgery had thrown off the barber's basin; but the step was premature. The surgeons could not yet stand alone without the barbers, and in the thirty-second year of Henry VIII. the Company of Barbers and the Company of Surgeons were united in one company, which still exists, with its hall, in Monkwell Street, and its famous picture by Holbein, in which the "bluff King" may be seen giving their charter to the company. Thus the two trades—for neither could be called a profession—that of the basin and that of the lancet—were inseparably joined together until the eighteenth year of George II., when the union was dissolved and the surgeons were constituted an independent company. It was not until the fortieth year of George III. that the company passed into the hands of the Royal College of Surgeons.

We have been thus particular in tracing the early history of surgery in England, and in showing how one of the noblest callings sprang from base beginnings, because we wish to point out the fact, that it is education and science which raise a mere trade like that of a barber, with his soap-suds and his basin, into an enlightened profession, which, while it alleviates suffering and confers the greatest blessing on the human race, is capable at the same time of satisfying the highest intellectual aspirations. So long as the surgeon went about blood-letting and tooth-drawing, now dressing a beard, and now "breathing a vein," he was little better than a barber, and was called a "barber surgeon." So long as he merely looked at the outward shape and fashion of the human frame, and now and then picked a hole in it or scraped its outer coat with a scalpel, he was a mere tradesman and quack, and his calling proportionately poor and mean. But when he passed from the outside of the wondrous house in which we all dwell, and penetrated into its innermost recesses; when he measured and surveyed it; when he undertook to renovate and restore—nay, when he was bold enough to mutilate and deface parts of it in order that the rest might remain and live: when he learned, after long and laborious inquiry, after generations of thinkers, each of which, as it came, caught up and carried on the lamp of science when its predecessor dropped it; when he learned, we say, so many of the secrets of humanity only to find how great his ignorance still was and how much remained for him to learn—then his base trade had passed into a profession, and to the knowledge of a sage he had united the humility of a child. This we take to be very much the position of surgery at the present day. A true surgeon may feel proud as he looks back to the time of Henry VII., and the days of Barber Surgeons' Hall, but as he looks forward and feels how short life is, and how slow are the steps of science, he knows that, however great her victories over ignorance have been, she has many more pitched battles to win over her enemy before he shall be finally subdued and laid prostrate at her feet.

The Edinburgh College of Surgeons lately passed a resolution, almost unanimously, that it is neither proper nor expedient that males and females should be associated together in the study of medicine, either in hospitals or in classes.

In Queen Anne's reign no physician, with the slightest pretensions to practice, could manage without his chariot and four, sometimes even six, horses.

CONSUMPTION.

Anatomy and Physiology of the Lungs.

BY CARL BOTH.

THE vital blood in its ceaseless nourishing current, requires restitution of appropriated, and expulsion of effete, or useless material; and the glands of our body are the organs by which these offices are performed. But we distinguish between single, or small glands, and complicated, or large ones. The first are represented by the dermal, intestinal, mucous, etc., glands; the others by the lymphatic, saliva, and progenital glands,—the kidneys, spleen, liver, and lungs. All these glands, in their outlines, exhibit a similarity of construction, but in their more minute details they differ materially from each other, in accordance with the various offices which they have to perform. These glands constitute a continued chain of laboratories, each of which performs its own especial part of the work to be accomplished by the series; and keeping these facts in view, it will not be difficult to comprehend, that if even one of these laboratories of the whole chain, or series, ceases to perform its offices, or to perform them imperfectly, the others must necessarily suffer in consequence. And since these glands hold such intimate relations to each other, it must be obvious that in study it is not possible absolutely to isolate any one gland beyond a certain degree; therefore, in specifying the lungs only, it is taken for granted that the reader already possesses some general idea of glands and their office, as otherwise it will not be possible for him fully to understand what may be said on this subject.

The office of the lung is to intermediate the exhalation of used gases, and the absorption of required fresh ones. Its office is therefore a double one. But before we can know how it performs these two offices, we must look at its material and construction. Let us imagine two large elm-trees *without leaves*, with hollow trunks and branches, even the very smallest ones, accurately tied together, having all their finest branches united to one another in such a way as to admit of fluid passing through them from one trunk to the other. We will next imagine that the crown of one large oak-tree, with hollow trunk and branches, having its *leaves on*, is carefully pushed into the crowns of the two elms, and that from each oak branch to each elm branch there is interwoven, by means of a very small india-rubber thread, a web somewhat resembling that of a spider, in such a manner as most thoroughly to connect them, and we have a somewhat exact, though rough picture of the lungs. In this picture, the hollow trunk of one of the elm-trees is made to represent the vessels which carry the blood into the lungs (the lung-arteries); and the hollow trunk of the other, the vessels which conduct the blood out of the lungs (the lung veins); the thin leafless branches of the two elms, represent the net of capillary blood-vessels in the lungs. The hollow trunk of the oak represents the trachea or windpipe, the

branches the fine bronchi, and the leaves of the oak the alveoles, or air cells of the lungs. (*See fig.* 1.) The web formed from fine india-rubber thread, represents the elastic connective tissue, which, by forming very minute square meshes, plays a very important part in respiration, and gives to the lungs great elasticity.

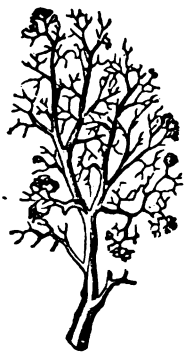


Fig. 1.—A branch of the lung bronchi before ending in the alveoles. After Henle.

The two lungs (left and right) have somewhat the appearance of a sugar loaf, and occupy the whole cavity of the chest, leaving only a small space between them for the heart. The lungs do not adhere to the walls of the chest, but move freely in their cavity by means of a double membrane, called the pleura. One sheet of this pleura covers the inside of the chest, the other the outside of the lungs, and both move one upon the other in every motion of the chest. These membranes are exceedingly sensitive, and any little injury done to them is extremely painful, while the lung tissue can be torn without any direct pain whatever. The lungs are made still more elastic and movable by being divided; the left one into two parts, and the right one into three. By means of this construction the lungs can be used freely in any bending position of the thorax, without pulling or tearing any part of them. Each large lobe—of which there are five—is again divided into several smaller parcels, which somewhat resemble the water-tight compartments of a steamship, and are called lobuli, or small lobes, which are separated from each other by a membrane, the object of which is to protect the other part of the lungs in case of injury or inflammation of one of the small lobes. In the middle, that is between the two lungs, the heart is placed, which also consists of two parts, the right and the left heart, the latter of which is by far the strongest and most powerful. The right heart, however, has all the power required for pumping the collected blood from the body into the lungs, and thus keeping up a continued flow through two large vessels, which, although they carry venous, and ***not*** arterial blood, are called lung-arteries. These two arteries branch out into smaller ones, and these again into still smaller ones, and continue to do so, until they reach the extremely fine capillary hair net of vessels which are neither veins nor arteries, and which have, of themselves, no power of muscular contraction, except that which exists in their own original cells. The fine capillary vessels wind themselves back and forward in a serpentine manner, and therefore have a longer course than ordinary blood-vessels. Their walls are exceedingly thin, penetrable for the blood-water (*serum*) only, and the blood moves in them slower and more irregularly than in veins and arteries, sometimes swelling them up, or enlarging them a little, and allowing them to contract again to smaller size. The power which moves the blood through them is not the heart, as has been supposed, but the act of respiration, as will be shown further on. The blood having passed these long, winding capillaries, enters into the lung veins, having now a fresh and lighter appear-

ance, from whence it is drawn into the left heart, to be immediately forced through the whole body with a power almost inconceivable.

In the lungs, in between the extensive net of blood-vessels, are found a very large number of small oval bags, which, in life, go up and down like bellows. These little bags are the air-alveoles, or air-cells (of the lungs), the walls of which are exceedingly thin, but of an entirely different structure from the walls of the capillary vessels, permitting nothing to pass through them but oxygen, or a gas of similar thinness. From four to six of these bags enter or open into the smallest bronchi, or so-called capillary bronchi, and these last into larger ones, and so on until the trachea or windpipe is reached.

The lining of these bronchi is very peculiar, consisting of a hairy coat, the hairs all standing with their ends towards the mouth, and in continual motion, so that if a light substance is put upon it, it will invariably be moved in the direction of the mouth, and never towards the lungs; hence all the dust which is inhaled, is caught by this fine hairy epithelium, and moved up again.

The air alveoles, the elastic tissue, and the capillary vessels, are the three actors, or agents, by which the office of respiration is performed, although several other organs are necessary, from the aid which they render, in maintaining them and their office. There are vessels which serve as purificators of any possibly left sediment or waste, by taking it up and carrying it into filters for purification. These vessels are called lymphatics, and the filters, lymphatic glands, which play as important a part in connection with the lungs as the gutters do in connection with the streets, or the safety-valve, the steam-engine. To bring the heart and lungs into general communication and harmony with the body at large, two nerves are employed. The first is called the pneumo-gastric nerve or vagus, and governs the motions of the heart and lungs. It originates in the brain, descends to the neck, then sends a branch to the thorax, and terminates in the stomach and liver. For the nutrition of these organs, another nerve, called the sympathetic, is employed. It does not originate in the brain, like the pneumo-gastric nerve, and has no single centre, but is spread all over the body like a large net. It sends a large branch to the chest, connecting with the vagus, and these together form the plexus pulmonalis of the chest. These nerves are everywhere accompanied by an independent net of blood-vessels, which serve only as nutritive agents, and are of less importance than the other blood-vessels in the chest. The complication of these two nerves (the pneumo-gastric and sympathetic), together with branches of the spinal nerves, control and facilitate the motions of the heart and lungs in exact correspondence with the rest of the body; and being connected with the digestive apparatus and with the brain, they demonstrate the direct relations between these organs and the heart and lungs.

The lungs (a spongy, fragile, and very elastic organ) are protected on the outside, by the ribs, and by their ligaments and muscles, the construction of which is very curious and extraordinary.

They are movable in all directions, elastic like a steel spring, intensely strong, and secured against injury from the outside. Towards the abdomen, the lungs and heart are separated from the stomach, liver, and intestines, by a muscle, which, by means of its spiral fibres, is also exceedingly elastic; so much so that, even were the bony part of the chest by some accident to lose its elasticity, respiration could still be carried on by means of this muscle. The frame of the male chest is very much stronger and less elastic than that of the female. By means of this superior elasticity of the chest in woman, she is able, when *enceinte*, to breathe freely, without the aid of the diaphragm; but were it otherwise, she would nearly suffocate. It will be noticed that a man, when out of breath, elevates his abdomen, and a woman, under like circumstances, elevates her chest. Hence we distinguish between a pectoral and an abdominal breathing. The experience, that lacing around the waist is much less injurious for the female than it is for the male, rests upon the fact, that the former has the power of breathing entirely from the chest, which the latter does not possess. It is this elasticity of the chest, as we shall learn further on, which constitutes the principal reason that a certain and invariable experience has been observed, though never explained,—that consumption in woman is always more or less arrested when she is *enceinte*. Having thus given a brief outline of the elements which constitute our respiratory organs, our next object is to present them in a state of operation.

The Mechanism of Respiration.

It is demonstrated in all books of physiology, and in all medical schools, that the combinations of the oxygen of the air with the blood, and the exhalation of carbonic acid from the blood, is effected according to a law of nature, as established by Henry and Dalton, which is called the law of the diffusion of gases. As no two substances exist which exhibit the same weight, any two liquids or gases have the absolute tendency to equate the difference by diffusion, or mechanical mixture; the same thing being called chemical affinity when applied to chemical combinations.

As the blood-globules, as well as the fibrin of the blood, have the power to absorb oxygen from the air by chemical affinity, it was thought that the rest of the mechanism of respiration was performed by direct mechanical diffusion of the carbonic acid gas from the blood with the oxygen in the alveoles. The incorrectness of this theory was discovered by the writer. It has also been acknowledged by Prof. Traube and Prof. Hermann, in Berlin, that such process is impossible. The former advanced, that an unknown ferment agent might be the means of the process, while the latter showed that the amount of carbonic acid gas in the alveoles is larger than that in the blood, and therefore that a diffusion of carbonic acid from the blood into the air-cells, is absolutely impossible.

The following theory upon this subject is the result of a laborious and long-continued study. The accompanying cuts (*Figs.* 2 and 3)

are designed to represent the mechanism of respiration; being a semi-schematical view of the extent of inspiration and expiration. When the alveoles or air-cells are extended by the air taken into them by the act of inspiration, the meshes of the elastic tissue are necessarily compressed, as represented in *Fig.* 2; while on the other hand, when the air is expelled from the alveoles by the act of expi-

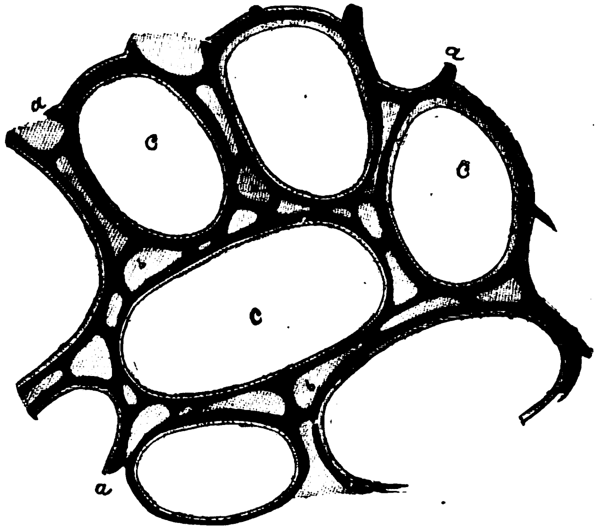


Fig. 2.—A semi-schematical microscopic view of a piece of the lung at full inspiration. *a a a*, capillary blood-vessels; *b b b*, elastic tissue; *c c c*, alveoles.

ration, they are extended, as represented in *Fig.* 3. It is by means of this extension and compression of the elastic tissue that the exchange of the gases of the blood with that of the air is effected. The walls of the capillary vessels, here, as everywhere in the body, admit the blood-serum to pass through them, while the blood-globules and the fibrin, under normal conditions, must remain inside or within the capillary vessels. Therefore, when the meshes of the elastic tissue are extended by the act of expiration, and the pressure upon the capillary vessels correspondingly diminished, the blood-serum runs into and fills the volume of the meshes, and is the medium by which the used carbon is carried to be discharged. The expansion and contraction of the alveoles or air-cells, as has already been shown, is occasioned by the air which enters them on each act of inspiration, and leaves them on each act of expiration. But the air, as is well known, is composed of the two gases, oxygen and nitrogen; and, on the average, consists of about twenty-one per cent. of the former, and seventy-nine per cent. of the latter, exclusive of the moisture and other mixtures in it. The oxygen of the air enters the body through the walls of the alveoles, which, in some measure, comes back again as a part of the carbonic acid exhaled; and in some measure is carried into the blood and enters the blood-globules, by entering with the blood-serum into the capillary vessels. The

nitrogen, on account of its greater density, cannot pass the walls of the alveoles under normal circumstances, but serves as a mechanical agent to extend them. It is therefore just as necessary in the economy, as oxygen. A man could breathe but a very few minutes in pure oxygen, and he could breathe about as long in pure nitrogen. The one is the necessary chemical substance for life, the other the

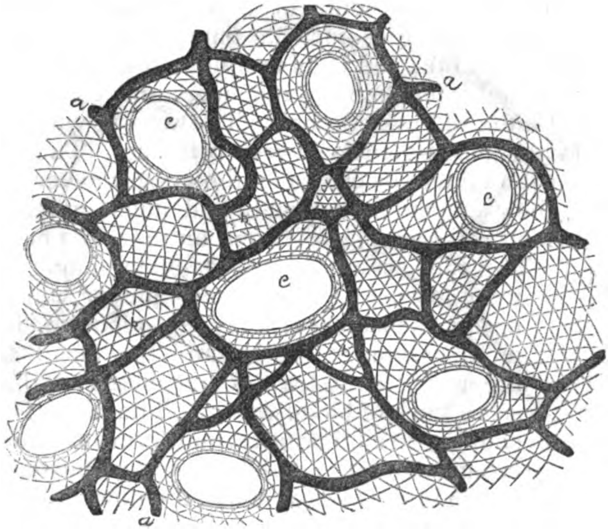


Fig. 3—The same as Fig. 2 at full expiration. *a a a*, capillary blood-vessels; *b b b*, elastic tissue; *c c c*, alveoles.

necessary mechanical motor; hence both are equally necessary. The fact of the different actions and density of the two gases was discovered by the writer some twelve years since, but was experimentally proved by the lamented Graham, of London; who, by filtering air through india-rubber shavings, succeeded in increasing the percentage of oxygen to forty per cent., or to about double the quantity usually found in the air. By this experiment, he has proved beyond a doubt, that nitrogen is more dense, or thicker, and therefore less capable of penetrating, than oxygen. (See *Scientific American*, May 1, 1869, page 279.) The capillary vessels are so constructed as to admit of the passing of the serum through their walls, but not of common air; and the alveolar walls will admit of the passage of a thin gas, as oxygen, but not of any liquid whatever, nor of a gas more dense than oxygen. The meshes of the elastic tissue constitute the point where the two meet. When the meshes are compressed by the act of inspiration, the blood-liquor (serum) is forced back into the capillary vessels, and the gases into the alveoles. And since the serum passes more readily into the meshes than back into the capillary vessels, the act of inspiration is performed more slowly than that of expiration. For the act of inspiration, by compressing the meshes of the elastic tissue, forces back the serum into the capillary vessels, and thus causes the blood to move onward, while by the act of expiration the blood is momen-

tarily stopped, and hence the microscopical observation that the blood sometimes apparently runs backwards in the capillaries of the lungs.

The blood itself consists of solid and liquid matter, which is partly organized, and partly only held in solution. The blood-globules are the organisms which perform the necessary chemical changes in the blood while circulating. They are little cells, which have a diameter of one three-hundredth of a line, and are very flexible. They have a round, though somewhat flattened form, and are red in color. In addition to the red cells there are also white ones, which are usually a little larger than the red ones, and contain nuclei and granules, which the red ones do not. The way in which the blood-cells move in the blood-vessels is very peculiar. The red ones always move in the middle or centre of the vessel, never touching its walls unless their current is stopped, and much quicker than the white ones, which roll along slower, and on the walls of the vessels. (*See fig.* 4.) The other component parts of the blood, are the different forms of albuminous matter, called in bulk, protein substances; they are globulin, fibrin, albumen, casein, etc., etc., and the blood salts, which are partly united with other matter, and partly only solved in the blood-water. The fibrin is capable of shaping itself into a certain form, and under normal circumstances, like the blood globules, always remains in the vessels, while the other albuminous matter is entirely shapeless, and penetrates the walls of the vessels to nourish the tissues. The blood circulates in the lungs, for mechanical reasons, slower than in any other part of the body. Its flow is also unsteady and interrupted, which does not occur in any other organ. The peculiar construction and functions of the lungs, therefore, make them subject to diseases which we do not observe in any other organ of the body.

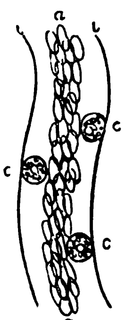


***Fig.* 4.—A microscopic view of a capillary blood-vessel, showing the red globules in the centre, and the white ones, which move slower than the red ones at the wall. *a a*, red globules; *b b*, wall of vessel; *c c c*, white globules. After Virchow.**

A thorough and comprehensive knowledge of the process of respiration is essential to the right understanding of Consumption; therefore all who wish to understand future explanations, should, as far as possible, make themselves acquainted with it.

To recapitulate:—The right heart pumps the venous blood into the lungs, forcing it onward until it reaches the capillary vessels, where its power ends: the blood then moves slower and interruptedly, on account of its absorption of new oxygen, and the unloading of carbon, which is accomplished by the meeting of the blood-serum with the oxygen in the meshes of the elastic tissue. The alveolar walls being impenetrable for nitrogen, are extended by each inspiration, which, by pressing back the elastic tissue, forces each to its respective place again (the gases in the alveoles, and the blood-serum in the vessels), and thereby forces the whole blood to move onward towards the lung veins, from whence it is drawn into the auricle of the left heart, and diffused by the very powerful left ventricle through the organism, returning again into the lungs in about five minutes.

It appears that no direct contact between the whole blood and the air exists, but that both send a representative which meet in the meshes of the elastic tissue, exchange gases, and return again to their respective places. The nitrogen of the air was supposed to be only necessary as a dilutive element to the oxygen, but instead of this, we find that it constitutes the mechanical power which drives the blood through the long winding capillary vessels, by extending the walls of the alveoles. The breathing of pure oxygen produces acute pneumonia, and it has been supposed that this was owing to its too intense action; but we maintain that it is because that the blood in such case cannot pass the lungs, not having the mechanical agency of the nitrogen to extend the alveolar walls, and press back the elastic tissue; consequently the law of the diffusion of gases does not come in question, until the gases meet in the alveoles and bronchi before being exhaled. It is owing to a misunderstanding of this process of respiration, that all theories and investigations in regard to Consumption have been confused and of no avail, while, if based upon it, any and all phenomena may be easily and logically explained.

Lord Stanley on Health. — In his recent able address, Lord Stanley said to some men starting in life:

"Let them recollect that the race in which they are engaged is one which will last all their working days, and in which endurance is more important than speed. They know already that intemperance is one form of suicide — let them remember that all neglect of physical laws is open to the same reproach, and that there may be intemperance in work as well as in meaner indulgences. You cannot have mental efficiency without health; you cannot maintain health in an exciting and exhausting employment, such as most mental occupations are, when eagerly followed, without some care to preserve it. What I had to tell you about keeping up literary tastes has been said already. They are a great pleasure — a wholesome and a lasting one. Keep them up if you can, and as long as you can. But while you do that, remember also that there is one thing as compared with which not only material health and luxury, but all art, all literature, all science even, are relatively unimportant, and in regard to which the poorest laborer may compete with any of you on equal terms — I mean a steady, untiring performance by each individual of his public and private duty."

A court in Michigan has decided that a physician is not warrantor or insurer of a case, and he is not to be tried by the result of his remedies. His only contract and duty is to treat the case with reasonable diligence and skill.

An English Life Insurance Company has just paid the insurance of a man who took out his policy in 1799, and died recently at the age of one hundred and three — the first instance in which insurance has been paid on the life of a centenarian.

A young lady, having read about a man having invented a stove which will consume its own smoke, hopes he will next devise a method whereby tobacco-smokers can be run on the same economical principle.

Behavior of Medical Students.— The last Introductory at Guy's Hospital, London, was the occasion of a most disgraceful outbreak. Screeching, cackling, baaing, yelling, singing of popular songs, etc., contributed to swell the uproar which utterly drowned out the voice of the professor; but these harmless amusements were laudable, compared with the knocking off and demolishing of visitors' hats with walking-sticks, and the showers of spitballs, peas, explosive pellets, etc., which greeted the professors and their friends, especially those whose bald heads offered conspicuous targets. The scene was made more ludicrous by the course of the lecturer, who told his audience that he had his lecture packed up ready for the press, and that they could read it in the papers, and then described his own student-days at the German universities, with their duelling, their beer-parties, and other peculiar rowdyisms.

We do not remember ever to have seen anything like this in our own country. During the intense excitement just before the breaking out of the war, we indeed once saw the lecture-room in an uproar, but it was the uproar of angry civil strife, when every one was on his feet,— when men were already commencing to fight,— when knives were out and the air was full of curses. We well remember how one of the professors rushed among the students in his shirt-sleeves, and, with stentorian voice and wild, imploring gestures, stilled the tempest just in time to prevent bloodshed.— *Med. Times, Phil.*

Were the question asked of each individual whether he would prefer to live long or die early, it is not difficult to guess which way the votes would run; but it is, nevertheless, a paradox that practically nine out of every ten people act as though their sole object was to ruin their health and shuffle off their mortal coil as soon as possible.

Sheep's Milk.— Professor Liebert, of Breslau, referring to the milk of different animals, says that sheep's milk is by far the richest and best constituted, and has a more agreeable taste than goats' milk. Its large amount of albumen also causes it to rank before goats' milk. One-sixth of its total weight consists of solids, and more than one-ninth, including water, consists of casein, albumen, and butter. It cannot be doubted, he adds, that a milk of this composition recommends itself for cases of milk treatment, and it appears almost incredible, that up to the present time, the whey only of sheep's milk has been employed for therapeutic purposes.— *Pacific Med. and Surg. Jour.*

Is it Sense or Nonsense?— Professor Tyndall is quoted as the author of this utterance: "I entertain no doubt that a sky quite as vast as ours, and as good in appearance, could be formed from a quantity of matter which might be held in the hollow of the hand." Now, as Professor Tyndall said so there must be something sublime in the idea, and one might ponder over it in an hour without reaching its bottom. But what if George Francis Train had made the speech?— *Ibid.*

Bayard Taylor on Quacks.—"I am not blood-thirsty, but I should feel little grief if the Indians were to pounce upon and carry off, beyond the reach of rescue, every agent of quackery who defaces the finest scenery of the road. Cannot the two great railroad companies prevent this outrage? At the Sherman Summit, along Green River, in Echo and Weber Canons, in the Humboldt Palisades — wherever there are noble masses of rock — you find them painted with the unclean shibboleth of the quack. Heaven forbid that I should mention *whose* bitters, or lotion, or dentifrices, thus proclaim the vulgarity of its advertiser; but I have vowed never to use any such bitters, or lotion, or dentifrices, and I advise all overland travellers to do the same. The sight of this vile defacement — which no other country in the world would tolerate for a day — was the only disagreeable circumstance of my journey to and fro."— *Ibid.*

SKATES, SKATING, AND SKATERS.

WINTER comes with its frosts, the rivers are fixed in their channels, and the skater takes possession of the watery domain. It is impossible to name the inventor of the skate, but it is one of those inventions for which no one has a right to claim priority. Want, imperious want, called it into existence, and the only question that remains is who improved it? In this age of ours the skate is a beautifully-finished article, but originally it consisted simply of the jawbone of an animal — a horse or a cow — so fashioned as to glide easily over the ice. A pair of these primitive skates are still to be seen in the British Museum, and others are occasionally dug up at Moorfields and Finsbury, in England.

Construction of the Skate.—The wood of the skate should be slightly hollowed, so as to adapt it to the ball of the foot; and, as the heel of the boot must be thick enough to admit the peg, it may be well to lower the wood of the skate corresponding to the heel, so as to permit the foot to regain that degree of horizontal position which it would otherwise lose by the height of the heel; for the more of the foot that is in contact with the skate, the more firmly will these be attached. As the tread of the skate should correspond, as nearly as possible, with that of the foot, the wood should be of the same length as the boot or shoe; the irons of good steel, and well secured in the wood.

These should pass beyond the screw at the heel, nearly as far as the wood itself; but the bow of the iron should not project much beyond the tread.

If the skate project much beyond the wood, the whole foot, and more especially its hind part, must be raised considerably from the ice when the front or bow of the skate is brought to bear upon it; and, as the skater depends upon this part for the power of his stroke, it is evident that that must be greatly diminished by the general distance of the foot from the ice. In short, if the skate be too long, the stroke will be feeble, and the back of the leg painfully cramped: if it be too short, the footing will be proportionally unsteady and tottering.

As the position of the person in the act of skating is never vertical, and is sometimes very much inclined, and as considerable exertion of the muscles of the leg is requisite to keep the ankle stiff, this ought to be relieved by the lowness of the skates. Seeing, then, that the closer the foot is to the ice, the less is the strain on the ankle, it is clear that the foot ought to be brought as near to the ice as possible, without danger of bringing the sole of the shoe in contact with it, while traversing on the edge of the skate. The best height is about three-quarters of an inch, and the iron about a quarter of an inch thick.

The grooved or fluted skate, if ever useful, is of service only to boys, or very light persons, whose weight is not sufficient to catch the ice in a hard frost. It certainly should never be used by a person who is heavier than a boy of thirteen or fourteen years of age usually is, because the sharp edge too easily cuts into the ice, and prevents figuring. Fluted skates, indeed, are even dangerous; for the snow or ice cuttings are apt to collect and consolidate in the grooves, till the skater is raised from the edge of his skate, and thrown.

In the general inclination of the foot in skating, no edge can have greater power than that of rectangular shape; the tendency of its action is downwards, cutting through rather than sliding on the surface; and greater hold than this is unnecessary. The irons of skates should be kept well and sharply ground. This ought to be done across the stone, so as to give the bottom of the skate so

slight a concavity as to be imperceptible, which insures an edge whose angle is not greater than right. Care must be taken that one edge is not higher than the other; so that when the skate is placed upon an even surface, it may stand quite perpendicularly. The wear of the iron not being great with a beginner, one grinding will generally last him through an ordinary winter's skating on clean ice.

The bottom of the iron should be a little curved; for, if perfectly straight, it would be capable of describing only a straight line, whereas the skater's progress must be circular, because, in order to bring the edge to bear, the body must be inclined, and inclination can be preserved only in circular motion. This curve of the iron should be a part of a circle, whose radius is about two feet. That shape enables the skater to turn his toe or heel outwards or inwards with facility.

The more simple the fastenings of the skate the better. The two straps — namely, the cross strap over the toe, and the heel strap — cannot be improved.

Skating. — In learning to skate the beginner should, before venturing upon the ice, be able to fasten on his skates with precision, care, and firmness. In skating, confidence is everything, and to obtain this, in his first attempt he had better take the hand of some friend, or provide himself with a short stick, to preserve his equilibrium. He should avoid throwing his arms about, only slightly elevating them with each alternate movement of the legs. In commencing what is termed the ordinary run, the left foot should be firmly placed with the inner edge of the skate upon the ice; then throwing out the right with some little force, until its outer edge touches the ice, keeping the right shoulder forward and the body balanced upon the right leg as long as convenient; then perform the same manœuvre with the left leg, and thus, alternately changing the feet, continue to advance. When desirous of stopping, the two feet should be brought together, and the impetus allowed to subside by degrees. If, however, circumstances render it necessary that the skater should halt abruptly, he should press the heels of the skates upon the ice, being careful at the same time that in so doing he does not overbalance himself and fall backwards — a transition much more easy than agreeable. He may likewise, if he prefer it, bring his career to a close by turning sharply either to the right or left.

The whole theory of skating is comprised in few words.

It is simply to begin by walking on the ice, crossing the feet at each step, and they should practise it also who can only run forward on the inside edge, if they wish to become proficient. Walk any ten paces forward, crossing one foot over the other at every pace, and then walk the same line backward, crossing the one foot behind the other at every pace. A fall or two, at first, will often be the result, but in a few lessons it can be done without them. As soon as this is acomplished with moderate facility, still adhering to the crossing the feet, which is the whole secret, let the foot follow the skate, and the skater will find that he is insensibly, as it were, rolling both backward and forward on the outside edge. It is a simple truth, and is a mechanical certainty, that the leg once crossed, the skates on each foot can only rest on the outside edge, and the balance of the body in that position has been learned.

Skaters, etc. — The author of the "Messiah," Klopstock, was an enthusiastic lover of skating, even in his old age. At Altona he has been seen skimming over the ice for many hours at the time, attempting to call back that warmth of blood which age and inactivity had chilled. And not only was he an ardent admirer of this sport, but he tried to proselytize in its interest, and wrote fiery lyrics in its praise. Germany laughed a little at such enthusiasm, and asked, "What! the author of 'Messiah' linger over pleasures that are no longer suitable to his age?" But when Klopstock and Goëthe met for the first time, the one's sun about to set, the glory of the other just bursting over the world, what was the subject of their conversa-

tion? Literature, poetry, æsthetics? Not at all. The conversation turned upon the art with which they were familiar, and thanks to which we fly over the hard crystallized water on winged feet, like those of the Homeric gods.

It is said that Goëthe, who never skated in his boyhood, fell in love with the exercise under peculiar circumstances. The poet had ceased to visit Frederica of Sesenheim — that incident which has puzzled so many readers of the "Autobiography." The love-link was broken, and the poet is believed to have deeply regretted the step he had taken. Discontented with himself, tormenting himself with reproaches, which even his greatest admirers must think were more than deserved, Goëthe knew not how to banish the phantoms that beset him. In severe bodily exercise he sought relief from the annoyances of embittered memory. He passed from Frankfort to Darmstadt, from Darmstadt to Frankfort, in the midst of wind and tempest, singing his "Wanderers' Sturmlied," while the storm was beating in his face. But though he wearied himself out with these marches and counter-marches, nothing could calm the trouble of his spirit. If he sought a change in riding, black care mounted behind, and rode with him. At last, his friends attracted him to the ice, and taught him to skate. The poet was a persevering and enthusiastic student of the art whose praises Klopstock sang. This new employment gave a change to the current of his ideas, and had a beneficial effect upon his moral nature. He felt that it was to Klopstock that he owed, however indirectly, the salutary transformation that he had undergone, and one morning in December, when the frost was hard and clear, he jumped out of bed, and putting on his skates, recited, as if by inspiration, one of the verses of the poet.

Goëthe's enjoyment during his first skating winters was fondly recalled to the last, and in writing his wonderful "Autobiography," he speaks of his favorite exercise with an enthusiasm which age could not repress. "It is with good reason," he exclaims, "that Klopstock has praised this employment of our physical powers, which brings us in contact with the happy activity of childhood, which urges youth to exert all its suppleness and agility, and which tends to drive away the inertia of age. We give ourselves up to this pleasure with happy abandonment. A whole day passed upon the ice does not satisfy us, and we prolong the amusement far into the night. While other exercises, indulged in for an unusual length of time, weary the body, this one only seems to increase its suppleness and vigor.

"The moon coming forth from the bosom of the clouds, and shining with mild radiance over the snow-covered fields, the night wind that sighs as we cut quickly through it, the cracking of the ice beneath our feet, our flying movements — all suggest the savage majesty of the scenes of Ossian. We declaim after each other one of Klopstock's Odes, and when we meet together at night, we make the air resound with our praises of the poet whose genius has lent a grace to the pleasures of the ice. Like the young men who, in spite of the development of their intellectual faculties, forget everything for the simple games of youth, as soon as they have once recovered the taste for them, we seem, when skating, to lose entirely any consciousness of the most serious objects that claim our attention. It was while abandoning myself to these aimless movements that the most noble aspirations, which had too long lain dormant within me, were reawakened and I owe to these hours, which seemed lost, the most rapid and successful development of my poetical projects."

In Holland the taste for skating is even more fully developed than in Germany. In winter, the Dutch merchants adopt this method of conveying their commodities to market, and as they skim along their frozen canals, some amuse themselves by knitting, and all carry on their head the hampers that contain their wares.

In one of the most interesting provinces of the country (Friesland), skat-

ing races take place in almost all the towns. Indeed, this province could not be inhabited if the art were unknown, for the people would then be confined within doors during several months of every year. Thus, to the Frieslanders skating is less an amusement than a necessity, and both sexes actually skate more than they walk. No sooner can an infant keep himself on his legs than the irons are fastened to his boots, and his parents lead him on the ice, and teach him to use them. At six years of age the young skater has attained great proficiency, and moves with rapidity and elegance; but it is only between the ages of twenty and thirty, that he becomes a consummate artist; and from this period he continues to practise the exercise until he reaches extreme old age. The peasants have a heavy and awkward appearance when they are trudging along the road or laboring in the fields in summer time; but in winter, when their skates are on their feet, and their canals have become glittering roads of ice, the grace and velocity of their movements as they glide along are most surprising.

Winter, which everywhere benumbs the limbs and renders men inactive in disposition, has the exactly opposite effect in Holland, enlivening the people, bringing them into the open air, and putting them in good humor. Indeed, the transformation is so striking that it astonishes all strangers. Pilati, the author of "Letters on Holland (the Hague, 1780)," makes mention of this singular phenomenon as early as the eighteenth century. He wonders at the metamorphosis produced by the frost upon the *physique* of the inhabitants. "Heavy, massive, stiff creatures during the rest of the year, become suddenly active, ready, and agile, as soon as the canals are frozen." Travellers speculate upon the reason of the change, and ask whether it is that in winter the sun drawing forth from the earth none of the fogs and vapors which its beams cause to ascend in summer, the air is purer and more elastic. Whatever the reason, the fact remains that the people who creep about heavily in the fine weather, betake themselves suddenly, as soon as the snow covers the ground and the waters are bounded by the frost, to running, leaping, and dancing upon the ice. The citizens then travel from town to town, and even from province to province, with a celerity which contrasts strangely with their immobility during the warm weather. In the eighteenth century, the most expert skaters could go from Leyden to Amsterdam — a distance of fifteen miles— in an hour and a quarter; a feat which put the coach or carriage fairly to shame. In a work which dates from this time, "The Delights of Holland" (Amst., 1697), the case is mentioned of a father who travelled more than 120 leagues in one day in order to reach his son, who was in danger of death. Another person laid a wager that he would go three leagues on the ice more rapidly than the other would get over a league and a half on horseback, but the bet was declined. "The Hollanders," says the same author, "are like the birds of the air; they spend more time in flying than in walking." They could move so steadily on their skates that they carried baskets of eggs on their arms while going at their highest speed without breaking one.

And the children! These lumpish, chubby-faced little Dutchmen — who when playing on the ground in summer time will not put themselves out of the way to let a carriage pass, preferring to run the chance of being crushed beneath the wheels to being at the trouble of moving — what marvellous activity do they now show on the frozen canals! Pilati, to whom we have already referred, remarks, "The races on the ice are the carnival of the Dutch; they are their fêtes, their operas, their dissipations. At this season, during which many fashionable people in different parts of the world are ruining themselves by their extravagance, the only expense to which the Hollanders are put is the cost of a pair of skates, and the outlay is called for only once or twice during their lives."

At the present day the inhabitants of Friesland exhibit the same pecu-

liarity. Any one who has been among them in the warm season, should visit them during winter, and see their skate-races, which take place upon the large canals by which the country is cut up in every direction. Long strips of wood ranged in line are placed upon the ice to keep the competitors separate, for otherwise in the heat of the contest each might be tempted to spoil the chances of the others by running across their path. The course being sometimes more favorable to swift progress on the one side of this demarcation than on the other, the skaters are bound every time they turn to change the side. The lists are closed at the two extremities by ropes which run round by the sides of the canal, and along which there is always a multitude of excited spectators. The prizes consist of articles of considerable value, but to obtain them it is necessary to have been victorious in from sixty to eighty heats.

The races in which females alone are competitors are more interesting than those which are confined to men. The youth of the locality contend for the honor of attaching the skates to the feet of their female friends, and the fortunate swain who is allowed to perform this office is rewarded with a kiss. If these Atalantas of the north have not the strength of the men they have more grace; they do not equal their masculine rivals in speed, but they excel them in lightness and in beauty of style.

In northern countries skates have long been employed in the execution of military evolutions. The ground being for a considerable portion of the year thickly covered with snow, it has been found necessary that the troops, or at least certain corps, should be provided with skates to enable them to practise the exercise and manœuvres which could not, during the cold season, be performed without them. The soldiers of Holland go through all the evolutions of the military art upon the ice, but it is in Norway that it has been considered necessary to embody a special corps, known as the "regiment of skaters." The men are furnished with the skates in ordinary use in the north, that fixed on the right foot being somewhat longer than that on the left. Furnished with these the soldiers descend steep slopes with incredible rapidity, reascend them as quickly, cross rivers and lakes, and halt at the slightest signal, even while moving at the highest speed. To assist them in stopping thus instantaneously they have a long staff, shod with iron, similar to that used by travellers in Switzerland and the Pyrenees, to assist them in clambering up the glaciers and steep peaks. This staff, which sinks deep into the snow, is of great assistance to the regiment of skaters, and is used by them in all their manœuvres, whether in setting out on the march, or quickening or slackening their pace. It is also used to steady the men, and give them support when they are taking aim and firing. The accoutrements of these men are simple. The weapons are a light musket, suspended by a shoulder-belt, and a sword bayonet. But they manage these, and perform all their evolutions on the ice with a dexterity which astonishes strangers.

"It is not," says Blaine, in his "History of Field Sports," "in Holland, Germany, Russia, and America, only that skating is used as a great agent both of personal communication between distant localities, and of transmitting the necessaries of life from place to place. On the contrary, in the fenny districts of Lincoln, Huntingdon, Cambridgeshire, etc., in England, when the vast floodings have become frozen, and left only a broad expanse of ice far as the eye can reach, it is equally available, and almost as usefully employed as in northern climes. At such times, when not only all means of conveying the products of life from one locality to another, but also those of personal transit are extremely difficult to command, then is it that the skate is called into requisition, and the wearers set off at railway speed from one town to another, either on business or for pleasure, and ere they return have probably accomplished fifty or sixty miles with little fatigue, and, when pressed for time, have done it in

a very few hours. Some of them have been known to skate forty miles considerably within three hours. Nor is this all; on the contrary, being skate mounted, the traders are able, and often are seen, to push before them small sledges, or boat-shaped lockers, laden with wares of every description, from town to town."

During the early winter of 1806, after the battle of Jena, Maréchal Mortier received an order from the Emperor to make himself master, without delay, of the Hanseatic towns. The officer charged with the transmission of this order found himself at the mouth of the Elbe, which he required to pass, and which at this point is seven and a half miles wide. The question was to find a bridge, for without one a detour of twenty-two miles would have to be made up the one bank of the river and down the other before he could reach the point opposite to that at which he found himself. But the officer, knowing that time was precious, did not hesitate to adopt a resolution, which might, if unsuccessfully carried out, prove fatal to him. He procured skates, and rapidly passed from bank to bank of the newly-frozen river. His ingenuity and boldness in taking this course enabled him to deliver his despatch six hours sooner than he could have possibly done by the ordinary route.

In speaking of skating it would be unpardonable to omit reference to feats of skill, which consist in tracing figures with the iron of the skate, and which are always considered among the most marvellous of the skater's exhibitions of his art. A certain Swede is mentioned, who, borne upon his skates as on wings, designed with one foot a number of portraits, which, though not distinguished for photographic accuracy, were remarkable for the purity and neatness of the lines. We are also assured of the authenticity of a still more extraordinary feat. A young lady accepted a challenge to a correspondence upon the ice, and in a few minutes a question and answer were written down with an elegance unsurpassed by handwriting upon glass with a diamond. The famous Chevalier de St. George, who was marvellously expert in all exercises of the body, was, it is said, one of those who signed his name upon the ice with the blade of his skate. Many other statements as to wonderful achievements in this way might be quoted, but the majority are of a very apocryphal character. The ordinary figures are, however, accomplished by expert skaters with ease, and though the range is limited, most of them show the art in its most graceful developments.

FURS.

WITHOUT definition, everybody knows what is meant by fur — hair, short and soft, growing on certain animals for their protection against cold. Furs may be worn for use, or worn for ornament. Inhabitants of cold countries, where furry skins are accessible, soon discover that what is good for the clothing of animals is also good for the clothing of themselves; but the wearing of fur as an ornament is determined by quite other conditions. It would not seem that the ancient Greeks and Romans knew much about furs, or used them as articles of attire. This might not have been altogether a matter of taste so much as a necessity. It so happens that nearly every fur of beauty and value comes from animals that inhabit a very cold country, and with no very cold country were the ancient Greeks and Romans acquainted. In mediæval times the taste for furs first sprang up in Europe; and two especial furs, ermine and vair, having commended themselves to the heralds — ermine and sable, in language non-heraldic — acquired a fictitious value. Not only do furs, with hardly an exception, come from animals indigenous to very cold countries, but to be of greatest value the skins must be strip-

ped in winter time when the hair is softest and thickest. Norway and Sweden, Northern Russia, thence farther to the east, Siberia, these were the chief fur-yielding regions until the discovery of America. With the exception of seal-skins, the southern part of the southern hemisphere hardly contributes a fur-bearing animal, for the Antarctic circle is strikingly devoid of land.

Fur-bearing animals are of various families. Thus, to begin, the skins of hares and rabbits, and even cats, must be included as fur material, though in a humble way. Here then we have two animal orders, hares and rabbits being comprehended by *rodentia*, cats belonging to the *carnivora*. Seals belong to the almost fish-like tribe of *phocæ*, beavers are another example of *rodentia*, and thus running through a list of the known fur-yielders, we should fall in with a great variety of animal genera and species. Generalizing, we may say that the most valuable furs come from the weasel tribe. Thus a weasel known to naturalists as *Mustela Zibellina* yields the valuable fur sable, and *Mustela Erminea* yields ermine.

Considered as to their preparation, fur skins, when first obtained from the fur-hunters, are merely dried. They are next subjected to a sort of alum dressing on the plain side, and lastly made up into various articles of dress. Considered as a protection against cold, perhaps no dress material is so efficacious as fur; but our climate is hardly cold enough to suggest this use of fur otherwise than as an ornament. The natives of northern Europe are differently circumstanced. To them the wearing of fur attire is highly desirable, if not a necessity, and hence we find that at the annual sale of Hudson's Bay peltry in London, Leipsic dealers are the best customers. Highly desirable though fur attire may be to people who live in very cold climates, the probability is that after the lapse of some time yet indeterminate they will have to do without it, and for the following reason, easy to understand. Fur-bearing animals, at least the best of them, never have been, and seemingly never can be, domesticated. Either they must have their own deserts and wildernesses to live in, or they cannot live at all. The effect of land cultivation, with its concomitant thereto, human habitation, as restricting the range and diminishing the number of certain fur-yielding animals, is illustrated in the history of the beaver. At one time this animal inhabited most parts of Europe. The Rhone was conspicuous amongst rivers for its beaver population, from source to sea. As time sped away the European haunt of the beaver became restricted more and more to the north. At the present time the northern part of North America is the only part of the world where beavers are found in colonies. In Sweden and Norway single beavers may occasionally be met with, but not a congregation of them building and living in common, as in North America. The necessity of preventing colonization in parts of the world wherever fur collection is made a matter of trade, has been illustrated by the tradition and the practice of Hudson's Bay Company, an association that acquired exclusive trading privileges in the reign of Charles II., and maintained them almost intact down to the present year. The entire range of territory comprised in the Hudson's Bay dominions formed an enormous tract, about twenty times the size of Great Britian in all, and wholly uncultivated, with the exception of the one small portion called Rupert's Land. The cultivation would appear to be incompatible with the extensive prosecution of fur-trading operations. The chief localities of what may be called inland fur supply are Siberia and North America; of maritime fur supply the Arctic and Antarctic oceans, where various species of seal yield furs in some repute, and which of late have been held in especial favor by English ladies.

The rule that cold countries are fur-yielding countries especially holds good, as already stated, no fur of any particular repute coming from a temperate, much less a hot country. Chinchilla skins are, however, the produce of a

squirrel not inhabiting a cold country, and the reader need not be reminded that monkeys do not inhabit cold countries, yet fur dealers are not unacquainted in the course of their trade with monkey-skins. Two animals yielding elegant furs are natives of England — the marten or pole-cat, and the otter, both very scarce.

Although the most obvious application of fur to purposes of attire is that of wearing the skin to which it is attached, yet a second application of it, through the aid of felting, must not be forgotten. Before the wearing of silk hats became so general, the operation of fur felting was more commonly practised than now, but even now the skins of hares and rabbits command a ready sale, and their fur is mostly turned to account by felting. Being stripped from the skins, it is beaten into a mat-like body more dense than if it had been spun and woven, and is used for the bodies of felted hats and some other purposes. Before silk hats came into use, the favored material for men's head-covering went by the name of beaver. Only the best sort of hats had any real beaver hair in their composition at all, and even those very little; the commoner sorts were made of felted wool bodies, finished with the fur of hares and rabits. The use of felted hats in England only commenced in the reign of Elizabeth, and they were then at first restricted to the higher classes, people of middling and low rank being obliged to wear knitted woollen caps, by Act of Parliament.

Some fur-bearing skins require the hair as naturally presented to undergo some sort of artificial trimming before the beauty of the fur is developed. This is the case with seal-skins, otter and beaver-skins, all which have two sorts of hair, one sort long, coarse, and ungainly, the other short, thick, and lustrous. The three most valuable furs now known to commerce are sable, ermine, and the fur of the silver fox.

All the most esteemed sables come from Siberia, and are dark, approaching black in color. The American sable fur is light chestnut colored, inclining to yellow, as shown by the yellow sable brushes used by painters. Sometimes yellow sable is changed to dark sable by dyeing, but rarely with any great success. Not only does the color of the fur disappear, but the Chinese alone, it is said, can attach the dye so firmly that it will not come off by moisture and rubbing.

If moderate care be taken with a fur article of attire, it may be considered durable wear. The chief dangers to be apprehended are friction and the moth. Friction will rub portions of the hair away, leaving an unsightly spot, but an amount of friction necessary to accomplish this can hardly occur to any careful wearer. The danger of moth attack is more serious, but even this can be avoided by proper care. Whilst a piece of fur is actually in use, moths are not to be dreaded. The danger comes when the furs are stowed away, and more especially if by accident they are put aside a little moist. They should always be carefully dried, and if laid aside for any considerable time they should be peppered or strewed with broken camphor. Sandal-wood shavings, too, are in great repute for driving away moths, which indeed seem to have a general objection to anything aromatically odorous.

Although feathers are not fur, yet certain feathers attached to the skin are used like fur: of this grebe, the feathered breast of a bird commonly found in the lake of Geneva, is an example. Ostrich feathers, too, may be mentioned here as an article of attire, not to multiply headings. Until lately the only source of ostrich feathers was Africa, where they were obtained from wild ostriches hunted and killed for the occasion; but during the last few years a considerable quantity of this beautiful female adornment has come consigned from the south of France, and from French naturalized tame ostriches. In practice it has been found that the ostrich can be as readily domesticated as the barn-door fowl. All this African bird insists on is a tolerably warm paddock, the ground of which is sandy — like her native Sahara. These two requisites complied with, the ostrich will live and thrive, and, cruel though

the practice be, will allow her feathers to be plucked. Whilst on the bird, ostrich feathers are not so very elegant. Their preparation for ladies' head-dresses is a trade in itself, involving many processes of bleaching, waxing, wire dressing, steam curling, and dyeing. Some of these processes ladies can execute for themselves. Thus feather dyeing is rather more easy than wool or silk dyeing, and nothing is more easy than curling the ends of ostrich feathers by the aid of a blunt pen-knife and a jet of steam from the tea-kettle.

THE ORIGIN OF SOILS.

IF we dig down through the soil we come sooner or later to the solid rock. In many places the rock reaches the surface, or rises in cliffs, hills, or ridges far above it. The surface (or crust) of our globe, therefore, consists everywhere of a more or less solid mass of rock, overlaid by a covering (generally thin) of loose materials. The upper or outer part of these loose materials forms the soil.

The geologist has travelled over great part of the earth's surface, has examined the nature of the rocks which everywhere repose beneath the soil, and has found them to vary in appearance, in hardness, and in composition, in different countries and districts. In some places he has met with a sandstone, in other places a limestone, in others a slate or hardened rock of clay. But a careful comparison of all the kinds of rock he has observed has led him to the general conclusion *that they are all either sandstones, limestones, or clays, of different degrees of hardness, or a mixture in different proportions of two or more of these kinds of matter.*

When the loose covering of earth is removed from the surface of any of these rocks, and this surface is left exposed, summer and winter, to the action of the winds, rains, and frosts, it will be found gradually to crumble away. Such is the case even with many of those which, on account of their greater hardness, are employed as building stones, and which, in the walls of houses, are kept generally dry; how much more with such as are less hard, or lie beneath a covering of moist earth, and are continually exposed to the action of water. The natural crumbling of a naked rock thus gradually covers it with loose material, in which seeds fix themselves and vegetate, and which eventually form a soil. The soil thus produced partakes necessarily of the chemical character and composition of the rock on which it rests, and to the crumbling of which it owes its origin. If the rock be a sandstone, the soil is sandy; if a claystone, it is more or less stiff clay; if a limestone, it is more or less calcareous; and if the rock consists of any peculiar mixture of those three substances, a similar mixture is observed in the earthy matter into which it has crumbled.

Led by this observation, the geologist, after comparing the rocks of different countries with one another, compared next the soils of various districts with the rocks on which they immediately rest. The *general* result of this comparison has been, that in almost every country the soils have as close a resemblance to the rocks beneath them, as the loose earth derived from the crumbling of a rock before our eyes bears to the rock of which it lately formed a part. The conclusion, therefore, is irresistible, that soils, generally speaking, have been formed by the crumbling or decay of the solid rocks; that there was a time when these rocks were naked and without any covering of loose materials; and that the accumulation of soil has been the result of the natural detrition or slow wearing away of the solid crust of the globe.

THE THEORY OF A GLACIAL EPOCH AT THE EQUATOR.

AT the meeting of the American Association for the Advancement of Science, held in August last, Professor Orton read a paper which controverted Professor Agassiz's theory of the glacial origin of the Amazon Valley. He briefly reviewed the statements made by Professor Agassiz, that the Amazon formation did not contain a single marine fossil, and therefore was the product of an immense glacier which slid down from the Andes to the Atlantic. Professor Orton, however, in his expedition across the continent, discovered an immense fossiliferous deposit at Pebas on the Maranon, and subsequent researches had resulted in the discovery of several other localities abounding in Tertiary shells. A series of these were exhibited to the Association, and excited considerable interest, not only from the novelty of their forms, but also from the fact that they were found in the heart of the great valley where Agassiz declared there were none. The shells are of fresh or brackish water types, and plainly indicate that the Valley of the Amazon, like the Pampas of La Plata as shown by Darwin, is an estuary creation, or the relic of a vast Mediterranean of fresh water. In the minds of geologists present, these fossils settled the question of the origin of the valley; it was illogical and absurd to assume a glacial winter within the tropics when we do not discover one solitary sign of its presence,— striæ and boulders are not visible, and in their stead extinct shells are abundant. Professor Agassiz has declared that the Amazon clays are "drift" from the Andes, transported by glaciers, and ground down to an impalpable powder. But these fossils, some of them very delicate, are marvellously well preserved. Two explanations of the existence of these fossils have been given: (1) That they are accidental, being fragments of some formation elsewhere, mingled with the drift. But this hypothetical formation cannot be found, the valley being bordered by either palæozoic or cretaceous rocks. Besides, the fossils are *in situ* and identified with the peculiar Amazonian variegated clays. They must have lived and died in the vicinity of the spot where they are now found. (2) That the beds in which they are found may overlie the drift like the marine clay beds of Champlain. But the fossils are plainly of the same age as the formation in question, and cannot be later than the Pliocene. Moreover, the terraces which would result from submergence are not discernible within or on the borders of the valley.

Professor Orton also alluded to the glacial transmigration hypothesis, and showed by a comparison of the flora of the United States, and that of the Andean highlands, that there had been no mingling of plants such as would have resulted, had a vast glacier covered the whole, or even the greater part of North America. And the conclusion reached was, that facts were incompatible with the existence of an equatorial glacier, and even of an intertropical cold epoch.

DIET OF THE ANCIENTS. — The difference between the diet of the ancients and that of us moderns is very striking. The ancient Greeks and Romans used no alcoholic liquor, it being unknown to them, nor coffee, nor tea, nor chocolate, nor sugar, nor even butter, for Galen informs us he had never seen butter but once in his life. They were ignorant of the greater number of our tropical spices, as clove, nutmeg, mace ginger, Jamaica-pepper, curry, pimento. They used neither buck-wheat, nor French beans, nor spinach, nor sage, tapioca, arrow-root, or potato, or its varieties; not even the common, but a sort of marshgrown bean — not many of our fruits, as the orange, tamarind, nor American maize. On the contrary, they ate substances which we now neglect, the mallow, the herb, ox-tongue, the sweet acorn, the lupin. They liked the flesh of wild asses, dogs, the dormouse, the fox and the bear.

TECHNICAL EDUCATION. — Our system is deficient in technical instruction; we give no special drill for any particular trade. When our children are graduated from the public schools they have no preparation, by instruction, for any definite business. A boy must choose his occupation and fit himself for its duties without other instruction than the slow process of experience and observation. In the demand for labor and the changed circumstances of the time, the old apprentice system has passed away, and there is no convenient and proper substitute. Nearly all of our industrial labor is self-taught, and consequently in a great degree unskilful, compelling us to manufacture coarser fabrics, or import machinery and skilled laborers from Europe. Each large town should have a technical school established, to teach the particular branches of business followed by the inhabitants of the town and vicinity, not only for youth, but also for adults. From these schools would go forth, each year, graduates fitted to fill important positions in our various manufactories, with minds trained to apply the principles which have been slowly developed by their predecessors in the school of experience. Technical schools have been established by law in Germany, Prussia, Belgium, and other States of Europe, for the express object of enabling those countries to compete with their neighbors in all kinds of manufacture. They have been very successful, and wherever located the communities are prosperous, and the business of the town or village enjoying the advantages of a technical school, has largely increased. In this matter of technical education, we are far behind these countries. We should be so no longer. We are liberal in our grants for elementary and classical education; we encourage railroads and other public works; but thus far we have failed to stimulate and interest our youth in those special industries which are to give increase in population and material prosperity. Perhaps it will be found unnecessary to draw much money from the treasury to initiate the system, for the end may be accomplished by authorizing the cities and larger towns to establish such schools as are suited to the business of the locality, and support them in the same way that other schools are now sustained.

—From Gov. Claflin's Message.

ANECDOTES OF CHEMISTS. — The following anecdotes are related by Sholto and Reuben Percy in their excellent collection: M. Rouelle, an eminent French chemist, was not the most cautious of operators. One day, while performing some experiments, he observed to his auditors, "Gentlemen, you see this cauldron upon this brazier; well, if I were to cease stirring a single moment, an explosion would ensue which would blow us all into the air." The company had scarcely time to reflect on this comfortable piece of intelligence before he did forget to stir, and his prediction was accomplished. The explosion took place with a horrible crash; all the windows of the laboratory were smashed to pieces, and two hundred auditors whirled away into the garden. Fortunately, no one received any serious injury, the greatest violence of the explosion having been in the direction of the chimney. The demonstrator escaped without further harm than the loss of his wig.

— A professor of a Northern University, who is as remarkable for his felicity in experimenting as Rouelle could be for his failures, was once repeating an experiment with some combustible substances, when the mixture exploded, and the vial which he held in his hand blew into a hundred pieces. "Gentlemen," said the doctor to his pupils, with the most unaffected gravity, "*I have made this experiment often with the very same vial, and never knew it break in my hands before!*" The simplicity of this rather superfluous assurance produced a general laugh, in which the learned professor, instantly discerning the cause of it, joined most heartily.

Fifty surgeons have sailed from New York to Europe to join the German army.

French Justice. — A Paris *Pharmacien* has been subjected to a fine of one hundred francs, with costs, or to be imprisoned for forty days, as a penalty for supplying in a prescription a bottle of vin cinchonæ of the French Codex, instead of "Sequin's cinchona wine." Additional to this the unfortunate apothecary was compelled to have a copy of the judgment displayed on his door, and at the shops of nine other *Pharmaciens* residing near him. — *Amer. Jour. of Phar.*

Dean Stanley's Parrot. — A good story is told of the Dean's parrot, which was a great pet with the whole family. One day Polly managed to open her cage and get away, to the consternation of the whole household. After a great search, some one found Polly in the garden on the top of an apple-tree. The welcome news was communicated to the Dean, who, with the whole of the inmates, rushed out at once, accompanied by Dr. Vaughan, who with some friends were then on a visit to the Dean. Polly was found swinging herself in a topmost branch, but when she discovered the large audience below her, she looked gravely down at them and said, "Let us pray."

— A French lady, on her arrival in this country, was careful to eat only such dishes as she was acquainted with, and being on one occasion pressed to partake of a dish new to her, she politely replied, thinking she was expressing herself in admirable English, "No, I thank you, I eat only my acquaintances."

Little dear. — Papa, I wish you would give me some spirit varnish. Papa (puzzled) — What does the child mean? Sweet innocent — Why, Mary says that is what makes your nose so red!

— "How do you do, sare?" said a Frenchman to an English acquaintance. "Rather poorly, thank you," answered the other. "Nay, my dear sare," said the Frenchman, "don't thank me for your illness; I cannot help it."

— A little four-year-old boy sat alone in the parlor, when a new doctor came suddenly to see his sick mother. The doctor naturally wished to make his acquaintance, and said, "How old are you, my son?" "I'm not old; I'm new," said the boy.

— On a tombstone at Florence is this inscription — "Here lies Salvino Armoto d' Armati, of Florence, the inventor of spectacles. May God pardon his sins! The year 1318."

— Physicians recommend young ladies to form walking clubs. This is a matter in which steps should be taken.

— Lady Yarmouth asked Garrick one day why love was always represented as a child. He replied, "Because love never reaches the age of wisdom and experience."

Life Assurance. — There is no subject which occupies the public mind to a greater extent than Life Assurance, and certainly no subject promises so fairly to become one of great and permanent interest to communities growing hourly in enlightenment and comprehensive policy. Science has been brought to calculate its chances. Experience, with its gray sobriety, tests the truth of all its principles; and the wisdom of a maturer age fosters and encourages its practice and extension. Indeed, *he* must be but a tyro in the great school of Political Economy who failed to recognize the power of Life Assurance.

"Zizzie," the Soldier's Dog. — "After dinner," says a correspondent, "we went round some of the wards of the building in which the Anglo-American ambulance has taken up its quartersat Sedan. Here we first saw Captain Borsay, 897 de Ligne, who had a wonderfully faithful dog with him, named 'Zizzie.' It was but eight months old. It followed the regiment till it went into action, and was close to his master when he was shot through the thigh, and fell. Captain Borsay presumes the dog continued to follow the regiment, as he saw nothing of him for some hours. He was removed from the field, and placed wlth many other wounded soldiers in a barn at some distance. In the middle of the night he was aroused by 'Zizzie' licking his face. It is astonishing how the dog could have traced his master through some thousands of wounded. 'Zizzie' has never left him since."

— "Now, gentlemen," said Sheridan to his guests, as the ladies left the room, "let us understand each other. Are we to drink like men or beasts?" Somewhat indignant, the guests exclaimed, "Like men, of course." "Then," he replied, "we are going to get jolly drunk, for beasts never drink more than they want."

— A clergyman was censuring a young lady for tight lacing. "Why," replied Miss, "you would not surely recommend *loose habits* to your parishioners."

— Extract from the last French novel: "The countess fell back in a deadly swoon. When she revived her spirit had fled.

— A French barber's signboard reads thus: "To-morrow the public will be shaved gratuitously." Of course it is always to-morrow.

— An ass — he who assents to everything.

— A character, like a kettle, once mended, always wants mending.

The Power of a Smile. — If misfortune comes into your house, be patient and smile pleasantly, and it will stalk out again, for it can't bear cheerful company.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

THE WATER WE DRINK.

WHAT shall we eat, and what shall we drink? This is a question asked by all alike — rich and poor. The philosopher cannot live on his philosophy any more than the student can upon his study. There are hours when the merchant leaves his desk, the scientific man his laboratory, the politician his papers, the physician his consulting room, the tradesman his counter, the mechanic his workshop, the laborer his hod and spade — and all alike ask one question, however different in each case the answer may be (sadly different we know too well): —"What shall we eat, and what shall we drink?" I presume there is no one article of greater importance in this question of meat and drink than water; and the extreme interest that has been excited during the last few years respecting its relationship to health and disease, must be our apology for bringing the subject before our readers. Some years ago it was hard to convince the public of the dangerous character of the water of some of our pumps, and of the probability that they were the cause of several serious outbreaks of fever, and the like; but nowadays the tables are turned, and the slightest appearance of any malady, from cholera down to a whitlow, is immediately supposed to arise from some impurity in the water. Indeed, people seem to have gone water-mad, heaping sins by cartloads on its back, of which, there is scarcely a doubt, it is entirely innocent.

Water itself is a curious substance, and nature seems to have designed its peculiarities for great and important purposes. It is peculiar in respect to its contraction and expansion, for whilst most liquids expand on being heated at all temperatures, water (although it does not stand quite alone in this peculiarity) at certain temperatures contracts when heat is applied; and it is owing to this strange property that our rivers and lakes are prevented from becoming mere masses of ice during an intense frost.

Then, again, it is peculiar as regards its *specific heat*. The cook knows very well the length of time that is required for a large saucepan of water to become even warm, let alone to boil. Had it been full of alcohol or ether, it would not have taken anything like so long to rise ten degrees as when full of water. It is this peculiarity that maintains water in the liquid condition, and, indeed, renders impossible its existing long in any other form. I need scarcely stay to point out the importance of this peculiarity in the maintenance of animal and vegetable life.

Once again, I would note that water, of all liquids with which we are acquainted, possesses the greatest power of holding substances in solution. And this solvent power is not confined to its action on solids, but extends also to gaseous matter, the solution being mechanical in some cases, and chemical in others. The power that water possesses in taking up some gases is extraordinary. In the case of ammonia gas, seven hundred and eighty volumes are soluble in one volume of water; and, bearing in mind its vast solvent powers, there is nothing very extraordinary in the fact that absolutely chem-

ically pure water is an unknown thing in nature. Rain water is contaminated with the ammonia and other gaseous elements with which it meets in its downward progress. Even snow, as Liebig has shown, contains a considerable quantity of ammonia. In using the word "contaminated" I merely intend to imply that rain water is not chemically pure, because there can be but very little doubt that the presence of ammonia is not altogether unimportant in its influence on vegetable life; nor is it unlikely but that the excessively invigorating effect produced on vegetation by a shower of rain, may, to a certain extent, be due to its presence. I may just remark here that plants seem to revive more rapidly when sprinkled with water to which you have added a trace of ammonia solution, than when common water has been employed.

Then, again, as the water passes through the various strata, it takes up the several solid matters it meets with in its course. In some cases the amount of these solid matters will of necessity be somewhat great, owing to the solubility of the substances with which it meets. In other cases the amount will be very small, owing to their non-solubility. For example, Professor Brazier, of Aberdeen, Scotland, reports that the water of that town only contains between 3 gr. and 4 gr. of solid matter per gallon. In London water it varies from 17.0 gr. to 17.5 gr. per gallon in the summer, and from 21 gr. to 23 gr. in the winter. We often find 30, 40, and 50 gr. per gallon, whilst in sea water the quantity is very much increased, until at last we find (in the water of the Dead Sea) above 2,500 gr. per gallon, the whole of which is held in solution by the water.

Now there are few things, perhaps, that have excited the interest of water drinkers more than the animalcules found in water, and about which so much has been written, and so many sensational stories told. It is of course easy enough to terrify children and weak-minded people with a microscopic view of a drop of bad water, or by throwing upon a screen by an oxyhydrogen microscope some huge ugly creatures floundering about with strange uncanniness, and consuming with giant appetites their weaker and smaller brethren; assuring them at the same time that these are present in unnumbered millions in every glass of water they drink, whatever caution may have been used to get rid of them. We all know how some popular scientific books supply a pretty circular drawing, said to represent the animalcules in a single drop of water, an assertion that is utterly erroneous, and most sadly liable to mislead the public as to the real facts of the case. This pretty drawing is, we need scarcely say, too often the production of an artist's fancy rather than the truthful sketchings of the cautious investigator. It is such sensationalism and exaggeration that have so often led the public (as those who have given their attention to sanitary medicine are constantly reminded) from sources of real danger to fix their attention on purely imaginary ones. Let me not be misunderstood. Unquestionably, animalcules are to be seen in waters containing animal and vegetable life in a state of decay; but it is a pure myth to suppose that any ordinary microscope will exhibit, as so many imagine, a world of creatures in every drop of water that you take from your cistern or well.

And, further, admitting their existence in some waters, we must not condemn them off-hand. Their presence in water is, perhaps, after all an advantage, for they must live, and to live they must eat, and so they feed on the organic matter which the water contains; and their work being finished, it is only to give place to a new generation that shall fulfil similarly important duties. But though, regarding their presence from a physiological point of view, it is impossible to say that they are injurious to health; still there can be no doubt that it is desirable, as it is certainly more agreeable, to remove them before the water is employed for drinking purposes.

Fortunately they are never found in any water which has undergone care-

ful filtration. It is right to say that if the water is kept in a vessel, and the slight deposit formed after several days is carefully collected, and examined under the microscope, numerous small animalcules will no doubt be found, moving about with wonderful rapidity. It may of course be argued from this that, though filtration keeps the animals themselves back, it still allows the ova to pass. This may be true; but surely it is not difficult to suggest other causes to explain their presence in such cases.

Water, as everybody knows, is a compound of two gases — oxygen and hydrogen. Nothing more than these are necessary to form it; and what is more, anything in addition, if present, must be regarded as extraneous matter. This may be proved in two ways — analytically, *i. e.*, by splitting the water up into these two gases, and synthetically, by uniting them, and forming water again. The one is a process of pulling down — the other of building up.

Then, it may be asked, does a glass of ordinary drinking water merely consist of these two gases chemically combined? Certainly not. Water has such vast solvent powers, that, the moment it comes into contact with various gases and with the different strata and surfaces with which it meets in its course, it, as it were, licks them up and incorporates them into itself. Regarding, therefore, this solid matter from a purely chemical point of view, we must admit that it is an impurity — an adulteration — but an adulteration that nature has been pleased to bring about herself.

I say that this is our conclusion when regarded from a purely chemical view-point; but there are others from which we must observe it. He would indeed be a bad general who pitched his battle-ground, and arranged his army, merely from the view presented to him from one spot of high ground; so he is a doubtful man of science who looks at a question of this nature merely as a chemist, without at the same time regarding its broader physiological and sanitary aspect. And now, admitting that everything present in water, except oxygen and hydrogen, must be regarded as "impurities," — still, when we find that these impurities have an important work to do, and an important part to play — when we find that the mere question of agreeable or disagreeable taste so largely depends upon them (for who would drink flat, mawkish rain or distilled water) — then, I say, that sanitary and physiological science teaches us no longer to regard as impurities what are essential parts of this important beverage. I must here enter a protest against the use of the phrase "solid impurities," to express the solid matters present in water.

But to proceed. We take, say, a tenth of a gallon of water, and evaporate it to dryness. We find in the vessel in which we have evaporated it a certain amount of this solid matter, which no heat, however intense, can dissipate. The quantity varies immensely; but, taking London water as an example, where it has been fully tested, we shall find it amount to some 2 or 2.5 grains — that is, 20 or 25 grains in the gallon. These are the saline constituents; and, regarding them as a whole, we may divide them into two classes — first, *Alkaline Salts*, such as common salt or chloride of sodium; and secondly, salts of the *Alkaline Earths*, such as carbonate of magnesia, and carbonate, sulphate, and nitrate of lime.

Now there is one property of water that, generally speaking, attracts a great deal of attention, and it is not to be wondered at, for it is a very obvious property. This is hardness or softness. People have a great liking for soft water. Whether they are altogether right in their liking we shall consider afterwards. Not unfrequently a lodging-house keeper will recommend a special locality — in which, of course, she happens to have apartments to let — by assuring us that the water is "beautifully soft." It is a bait that often catches fish. We know a soft water by the ease with which we can wash in it, and the facility with which we can produce a lather. To what is the property of "hardness" due? Not to all the solid constituents of the water

(common salt has no hardening effect), but to the second class of salts which I have specified, viz., the salts of the alkaline earths (as of lime and magnesia) present in the water. That this is the case is easy of proof. Make a solution of soap in dilute alcohol; pour a few drops into 2 oz. of distilled water, and note what a permanent lather is produced by the addition of the merest trace of the soap solution. Add to another sample of distilled water some common salt, chloride of potassium, or sulphate of soda, and you will find that you will still be able to produce a permanent lather, with almost the same quantity of soap solution which you had added previously. But now take another sample of distilled water; put in it a little carbonate of lime or magnesia, or sulphate of lime, or nitrate of lime, or sulphate of magnesia, and note the large quantity of soap solution which you must add before you are enabled to produce a lather similar to what you obtained in the previous experiments.

It may be well to inquire for a moment here what happens when you wash in a hard water. You are first inclined to think that the water will not dissolve the soap — in ordinary parlance, "you can get nothing off it": but this is not the case, the fact being that the water decomposes the soap. Pure soap is a stearate or palmitate of soda. The stearic acid of the soap, in hard water, combines with the salts of lime and magnesia, forming stearate of lime and magnesia, which floats upon the top of the water in the form of a curdy, greasy-looking matter. With a soft water we have a lather produced, which is really nothing more than a solution of soap in the water. Its cleansing power is due to what is termed a detergency — that is, a power of rendering soluble in water the adhering dirt of the skin or clothes.

Now, in all analyses we state the hardness of the water. This determination is often a matter of very considerable importance. One of the most important domestic uses of water is to wash with: and for this purpose a soft water has vast advantages over a hard one. It is, of course, much less expensive (a matter of importance nowadays), inasmuch as in a hard water a great deal of soap has to be destroyed, as I have already pointed out, before a lather can be produced. Then, a soft water saves a great deal of labor. To wash your hands in a hard water is no easy matter; and, lastly, with a hard water the pores of the skin become so stuffed up with the insoluble stearate of lime, that it is almost impossible, under such circumstances, to enjoy the luxury of a good wash.

Now, the hardness of water is expressed by degrees, each degree of hardness corresponding to 1 grain of carbonate of lime, or its equivalent in other salts, in a gallon of water; so that, when we say a water is 16 degrees of hardness, we mean that it contains 16 grains of carbonate of lime, or the equivalent in hardening effect of these 16 grains in other salts, in the gallon.

But there is a circumstance, to which I must refer, that at first sight seems somewhat extraordinary. Both the carbonates of lime and magnesia are remarkably insoluble in water; a gallon of water will not dissolve much more than 2 grains of carbonate of lime, and not so much carbonate of magnesia. How then are these salts held in solution by ordinary water? The cause of their ready solution is the presence of carbonic acid, which is one of the gases ordinarily present in normal water.

And this leads me to remark that the hardness of water is of two kinds — a hardness that is *permanent* and very difficult of removal, and a hardness that is *temporary* and easy of removal. The former is due to the sulphates, nitrates, and other salts of lime and magnesia; the latter to the carbonates of lime and magnesia. These latter, I have said, are held in solution by the presence of carbonic acid, which carbonic acid is driven off when the water is boiled; and, consequently, the carbonates of lime and magnesia must in a great measure be thrown down at the same time. In this way (viz., by boiling the water) its hardness may be very often considerably lessened; but only that hardness, however, which we

have called temporary. The boiling decomposes the bicarbonate of lime and deposits the carbonate. Every one knows that the vessel in which water is constantly boiled becomes covered with a white deposit, which incrustation is due to these precipitated salts, mixed with small quantities of the other mineral constituents of the water. Engineers, alas, know too well how often the safety of boilers is endangered by this hard deposit.

The deposition of anhydrous crystals of carbonate of lime from water is presented to us on a magnificent scale in the formation of the stalactites and stalagmites in various caverns. Here water charged with carbonate of lime and carbonic acid enters the cave; the carbonic acid gradually escapes, and the carbonate of lime builds itself up, year after year, in increasingly magnificent pillars of the crystallized salt.

And now the question arises, are the advantages of soft water as great in a sanitary and dietetic point of view as we find them to be in an economic?

From an article in Food Journal, by C. Tidy, M.B.

WAR SURGERY.

BY AN ENGLISH ARMY SURGEON.

AMONG the subjects concerning which much misapprehension prevails in general, there may well be placed that of an army surgeon's duties during a campaign, and more particularly in the field of battle. Civilian newspaper correspondents cannot ordinarily have been spectators of the actions they narrate. Events are described, naturally enough, in somewhat stereotyped language, and the consequence is that erroneous impressions are formed in the public mind by means of the vivid pictures of warfare. Now, we do believe that the post of medical officer of a regiment in the field requires for its efficient performance the possession of much presence of mind, courage, and capacity for physical endurance. Let this be conceded, and past experience — the testimony of their brother combatant officers — fully bears out the fact that such qualities *have been* very generally evinced under trying circumstances. But it is a mistake to look at the military surgeon in a chimerical aspect. He should be regarded simply as a functionary who performs, under motives of high principle, humanity, and it may be not infrequently still loftier incentives founded on Christian faith, certain acts designed for the relief of those who are committed to his charge, whose lives are, humanly speaking, in his hands.

On the eve of a battle, one of the assistant surgeons — of whom the war complement is two, sometimes three — is detailed in order to accompany his corps into action. The principal medical officer determines whether he is to be senior or junior of the rank. Now as to his subordinates. Under the system hitherto prevailing, the bandsmen and drummers were placed under his orders, with the view of transport to the rear of such grave cases as were considered most urgently to need removal. Some few stretchers for carrying the wounded were also provided, but the number of these was generally found to be utterly inadequate to the requirements. A corporal on the hospital establishment, together with one or two trained orderlies, likewise attended the assistant-surgeon. One carried what is called a "field-companion," a kind of case, shaped like a fisherman's creel, and attached to the person in a similar manner. It contained bandages, lint, brandy, and other stimulants, neatly arranged in compartments. All these attendants conveyed with them their water-bottles, for it need scarcely be said that a craving thirst is often the immediate result of severe gun-shot wounds. Then, under certain conditions, ambulances and cacolets followed; but sometimes the nature of the ground interfered with their employment, and ordinarily they could not be used until an action was

over, remaining in the rear till summoned. A word as to these vehicles. The ambulance provided toward the end of the Crimean war was a very heavy, cumbersome affair. It was a covered wooden receptacle with four compartments, each holding an occupant in a recumbent position. Two horses were attached to each, a driver rode *a la postillon*, and other men on a seat in front. These officials were pensioners, a class found to be in every respect unfitted for the work. The cacolet originated with the French, who kindly left them often at our disposal. Placed on a mule, pannier-wise, were two seats, which, folding and unfolding somewhat like the steps of a carriage, enabled the wounded soldier either to sit or lie recumbent. A swinging motion is given, in many cases more bearable than the jolting of even a well-hung ambulance. Of late sundry inventions — their object being a vehicle capable of effecting an expeditious and easy removal of the wounded — have been devised both on the Continent and in England.

Moreover, a body of men trained to their work in the field will be available — a great desideratum. They would previously be selected for their intelligence, and instructed in the routine duties of the field, such as a recognition of the most dangerous cases, the situation of the great arteries of the extremities, and application of tourniquets and bandages.

Such men are greatly needed, the bandsmen being, hitherto, from their paucity in number and other causes, quite inadequate for the occasion.

Meanwhile the regimental surgeon, aided by his junior colleagues (together with the hospital sergeants and some three or four orderlies), fixes on a site as near to the battle-field as a reasonable regard alike for the security of the patients and himself admits of. Some judgment is called for and has to be exercised in this matter, as instances have occurred — in India, for example — where changes in the military evolutions, unforeseen complications possibly, have necessitated a speedy abandonment of the ground selected as a temporary hospital theatre, and a very rapid retreat of all parties concerned. To such locality, men who are considered by the medical officer in the field to require immediate operative proceedings — operations of what is termed the "capital" order, removal of a leg or arm — are conveyed. If a cottage or shed is accessible, the surgeon converts it, by the help of such rude means as are at hand, into a place somewhat suitable for the purpose required. Good light is, of course, the first consideration; and perhaps next to it a large table. If the latter cannot be found, one is improvised from the hospital panniers, which are so constructed as to supply, in some degree, the want.

And now let the reader follow a regiment into action for a brief space. The day may be sombre and depressing, or bright and beautiful, the air crisp and fragrant with the perfume of wild thyme, set free by the trample of many feet — a day when every object in the kingdom of nature looks its best. The noise of artillery is heard in the distance; the corps, previously halted, is ordered to march on. Proceeding from an enemy, possibly, from his position or a cloud of smoke, as yet invisible, a round shot appears in view, hopping leisurely along, somewhat like a cricket-ball struck with a moderate degree of force.

Advancing further, such missiles appear in mid-air. Then an object like a loose bundle of clothes lying on the ground meets the eye, which is quickly and instinctively averted. Alas! it soon meets with many such, is quickly familiarized with them; for war speedily and surely blunts our higher emotions. Onwards we go, amidst a pattering very like that of a hail-shower, interrupted by the loud booming of artillery; and then truly, if we be not infidels — even have never prayed since we left our mother's knee — we look up to the God of battles and ask Him to spare us. King David speaks of his head being covered in the day of conflict. Who that survives does not feel this to have been his case?

We are fairly in the mêlée, let us suppose, and how short a period elapses when, the smoke clearing off somewhat, we find the ground thickly strewn with men! Some shot through the head or heart, it may be, lie wholly prostrate, and though bereft of consciousness, the chest upheaves, as if man's frail body still struggled to assert its vitality — its power over the grave and the fiat of its Creator. Some grievously wounded lie also wholly supine; others half raised on the elbow, and, again, some in a sitting position — maimed, probably, in the feet.

The various characteristics of the individual come out at this time. The medical officer is recognized as he advances, and urgent entreaties for help are made by some, by no means necessarily the worst cases; while others, in deep suffering, preserve a calm demeanor, a manly fortitude, and resignation worthy of a Cæsar or Sidney.

Probably the first thing that occurs to the mind of a medical officer, when he finds himself suddenly surrounded by wounded, is his utter powerlessness to render assistance, however slight, to all. Suitable occupants for the few stretchers are quickly found; the supply of water and stimulants brought by his orderlies is soon exhausted, and then but little remains in his power to accomplish. He dresses some of the more severe wounds, not involving a mangled limb or shattered bone. For the latter a little brandy-and-water, if there be much exhaustion, together with an effort to ease the position of the sufferer, place support to some part of his body, the head or elsewhere, is probably all that can be done until means of transport arrive. To the others, lint dipped in water, the most suitable as well as available and expeditious dressing, is applied with a bandage over.

A wide-spread and erroneous impression prevails on the subject of excessive hemorrhage in the battle-field. It is believed to be a frequent occurrence, and that many lives are lost in consequence, before surgical aid is procured. Such is by no means the case. Military surgeons of experience well know how frequently and marvellously the great arteries escape injury, the tough material of which their coats are formed rendering them less permeable by missiles than the soft tissues which surround them. There are times when a vessel is directly severed, and, of course, death is then almost instantaneous. But, even when an arm or leg is shot off — the arteries torn across — Nature generally steps in, and bleeding is spontaneously and speedily arrested. This is brought about by the vessels being divided in a jagged manner, not evenly, as by an amputating knife; consequently the rough edges are better adapted to help the formation of coagulated blood, which the action of the open air speedily causes in a wound. In fact, the bullet or round shot more or less completely effects a result which surgical science has of late discovered and utilized, for the suppression of hemorrhage during operations in civil practice. The blow causes a degree of torsion — twisting of the coats of the artery — which, combined with a natural tendency in its open mouth to contract under the influence of cold air, and the mechanical obstruction produced by coagulated blood firmly adherent to the surface of the entire wound, generally prevents fatal hemorrhage. Caution is necessary in some cases, lest too much brandy or ammonia be given at this time; otherwise, with increased vital powers, the "pumping" action of the heart rendered more vigorous, serious bleeding might arise, perhaps while the wounded man has no help near to him.

There is, of course, more risk of hemorrhage from a wound inflicted by a cutting weapon, the action of which is that of a razor. We all remember the little images of nodding mandarins, which, in times past, used to ornament mantel-shelves. On the field of Balaklava we met with a living instance, in the person of an unfortunate Russian infantry soldier. The stroke of a sabre had completely divided the muscles of the back of the neck without injuring the spine. The results were equally appalling and ludicrous. He walked

with his head supported by both hands, which nevertheless failed to prevent it from swaying slowly backwards and forwards. It was as close an example of a man holding his head on his shoulders as could well be met with, apart from jugglery.

A word or two now as to another popular fallacy. Our friends, the correspondents, speak, during a war, of Surgeon Blank having performed operations in the open field under a heavy fire. The thing is simply impracticable. The site for a temporary field hospital may possibly not be wholly out of the range of artillery fire—be visited by a chance unwelcome guest now and then; but, unless the medical officer be utterly and unwarrantably reckless as to the preservation of his own life, and, far more, be guilty of an act of culpable folly with reference both to the wounded man and to his orderlies, he would not attempt, in such a position, to do more than resort to one or other of the temporary measures already spoken of. We have seen such an attempt made, and the result was the sacrifice of one of the orderlies, a round shot having fallen into the group. It is certainly a matter of very great consequence that operations of importance should be done as speedily as possible after the injury has been received; but then a due degree of circumspectness must be observed. This would be wholly unattainable under the circumstances referred to. So impressed was the writer with the advantage derivable from immediate operations, that, at the period of the siege of Sebastopol, when casualties occurred during the night—almost without the intermission of one—he invariably operated at once, without waiting for the morning. The results were very satisfactory. Well does he remember being awoke during the small hours by the creaking of cacolets, at first in the distance, then nearer, and at length the footfall of the mule past his tent, speedily followed by, "A man wounded from the trenches, sir."

Conservation—*i.e.*, such operative proceedings as aim at the preservation of an injured limb in lieu of amputation—is the great surgical doctrine of the day. As yet, during the present war, the results have not been so satisfactory as could be wished or were anticipated.

Chloroform and ether may well be viewed, and with all reverence, as the greatest physical blessings to mankind vouchsafed by the Creator. They not only, as is generally believed, remove all suffering during the operation, but stimulate the system, give what may be termed a "fillip" to the constitution, and speeds the patient—possibly a young lad of little stamina, who would otherwise have speedily succumbed—on the high road to recovery.

After a great battle, the wounded are usually removed to large permanent hospitals, or, if the sea be near, to vessels, with a like ulterior object. Such necessity is unfortunate, for experience shows that in marquees (the field hospital proper), where there is free access of air, the percentage of recoveries is far higher than elsewhere.

ON POISONS.

Antimony.

ANTIMONY is a brilliant white metal, with a high metallic lustre; it is flaky, and easily breaks up; under slight pressure, it is so brittle that it can be reduced to a fine powder in an ordinary mortar. It has been obtained in rhombohedral crystals, and many specimens of the metal are covered superficially with arborescent forms, resembling fern fronds. It is largely used in the arts to give hardness to the alloys of which it forms a part. Britannia metal, which is used in making articles for domestic purposes, and type metal, are alloys of antimony: the former contains also

brass, tin, bismuth, and lead; the latter simply lead — though the better kinds contain tin as well. Although antimony is a very brittle metal, it seems to lose this property when alloyed with others, giving to the mixtures hardness, as in type metal, and a certain amount of toughness, as in Britannia metal. An alloy of antimony and iron has been made, which is exceedingly hard, but it possesses no commercial value. Antimony is sometimes found native, but its most common ore is the sulphide or sesqui-sulphide, which contains two atoms of the metal and three of sulphur: that is, by weight, twice 122 parts of antimony, and three times 32 parts of sulphur; the atomic weights of antimony and sulphur being respectively 122 and 32.

The metal can be obtained from the sulphide in several ways; but the most simple is to fuse it in a crucible with some iron filings. The sulphur unites with the iron, forming sulphide of iron, and the metallic antimony sinks to the bottom of the crucible. It is not, however, pure; it still contains arsenic, which is a constant impurity of this metal, and iron, with perhaps traces of copper and lead.

Antimony was known to the ancients, and was used as a cosmetic. Jezebel is said to have painted her eyes with it; the word used is stimium. Stibium is, however, the name given to it by the ancients, but stimium is also used for it. Antimony was known to the Arabians, and was by them called Atemed, and this is supposed to be the derivation of its name, though others have been given. The alchemists made frequent use of antimony in their endeavors to discover an elixir for the prolongation of human life. It was called by them Lupus vorax and Saturnis; it was also called by several other names, amongst which was Alcohol. The Tetragonon of Hippocrates is supposed by some to have been antimony. The sulphide, not the metal, was known to the ancients, and they obtained an impure oxide by roasting it. It seems to have been pretty generally used for painting the eyes, especially by the Moors, who introduced it into Spain.

Chemically, antimony belongs to the same family as arsenic. Nitrogen, phosphorus, arsenic, antimony, and bismuth, all have chemical properties so much resembling one another, that chemists class them in one group, although their physical properties are very different. The atomic weight of arsenic is 75, that of antimony 122; and it is found that antimony and its compounds differ from those of arsenic in the way that one would expect from this difference in their atomic weights. Arsenic is volatilized at a moderate heat, whereas it requires a much higher temperature to convert antimony to the state of vapor. Arsenic oxidizes more readily than antimony: for the former metal, by simple exposure to moist air, becomes partially oxidized, forming the substance known as fly powder; but the latter does not take up oxygen in moist air, it only does so at high temperatures, when it burns brilliantly, forming an oxide which consists chiefly of the higher oxide. Antimony, like arsenic, forms two compounds with oxygen, one in which the proportions are twice 122 parts by weight, or two atoms of antimony, to three times 16 parts, or three atoms of oxygen; and the second, or higher oxide, contains the same weight of the metal to five times 16 parts by weight of oxygen. Arsenious acid, the lower oxide of arsenic, is slightly soluble in water, but the corresponding oxide of antimony is quite insoluble. Arsenic acid dissolves readily, but antimonic acid does not dissolve at all in water. When arsenious acid is heated, it speedily vaporizes, but the oxide of antimony is much less easily volatilized. This difference serves, in testing, for a distinction between the two substances.

The chloride of antimony, which corresponds to the lower oxide, commonly called butter of antimony, is a transparent solid, having a crystalline appearance not unlike the compound used as a pomatum, which is made by dissolving a small quantity of wax in olive oil. This chloride is easily de-

composed by water, forming an oxychloride, which was formerly called the Powder of Algaroth. The chloride is used in the arts in bronzing gun-barrels. A very important compound of antimony is the artificial sulphide. It is used as a pigment, under the name of Antimony Vermilion. It has not, however, the brilliant red color of the true vermilion, which is a sulphide of mercury. But by far the most interesting to the toxicologist of all the antimony salts, is that which is called in the pharmacopœia, Tartar Emetic. Its chemical composition is explained by regarding it as hydric tartrate (tartaric acid), in which one atom of hydrogen has been replaced by an atom of potassium, and a second atom of hydrogen by the antimony radical, which is represented by the symbol Sb O — that is, one atom of antimony, the symbol for which is Sb, derived from the Latin name stibium, and one atom of oxygen. This body, Sb O, has no separate existence. It cannot be obtained alone; but when hydric tartrate reacts upon antimonic oxide, which it readily dissolves, some of its hydrogen unites with part of the oxygen of the oxide, forming water, and the remainder of the oxygen and the antimony take the place of the hydrogen which the tartrate has lost. Now, this salt of antimony and potassium differs very materially from the other compounds of antimony. It is very soluble in water, whereas the others are insoluble. If the terchloride, which has been already alluded to, or if the penta-chloride, which contains more chlorine, be thrown into water, the water immediately becomes milky, owing to a precipitate of oxychloride being formed; but no such effect is produced by the action of water on tartar emetic.

Tartar emetic is made by boiling the acid tartrate of potash with oxide of antimony: the proportion in which they are mixed is six ounces of the former to five ounces of the latter. After boiling and filtering, the salt crystallizes out on cooling. This substance has been long used in medicine; at one time it was largely employed in fevers and in acute inflammation, sometimes in large, sometimes in small doses, but of late years it has almost entirely ceased to be employed in these diseases. It is a powerful emetic, and when used for this purpose it is given in doses of from about two to three grains. Externally, it is very efficient as a counter-irritant, and is employed in the form of an ointment, or in solution in water. But in large doses it is an irritant poison, and its effects, as such, we have now to consider especially. Cases of poisoning by antimony are of rare occurrence. The quantity required to cause death is, in most instances, considerable; this is, no doubt, owing to its producing vomiting almost immediately after it has been swallowed. Professor Forget, of Strasbourg, mentions the case of a strong man, suffering from acute rheumatism, who took a dose of seventy-two grains after commencing with smaller doses, and in ten days he took as much as three drachms in water. Beck relates a case of a child who was killed by taking fifteen grains of tartar emetic, and cases are recorded where two grains in an adult, and three-quarters of a grain in a child, have caused death. Death has also followed its external application. An infant, two years old, died in forty-eight hours after its spine had been rubbed with the ointment of tartar emetic. Very serious effects have been produced by moderate doses of this poison. A case is quoted by Dr. Christison, from the "Bulletin des Sciénces Medicales," of a woman who took six grains wrapped up in paper. She was seized with vomiting in half an hour, which soon became bloody. In two hours the decoction of cinchona was administered with good effect, but she had severe colic, diarrhœa, pain in the stomach, and some fever. She was not cured for five days. When antimony is used by the poisoner, it is generally administered in small and frequent doses. Of late years it has been employed in this way. It is supposed by many that it was with antimony, not with strychnine, that Palmer, in England, poisoned his

victim. The cases of Dove, Smethurst, and MacMullen, have also rendered the consideration of antimony, as a poison, interesting and important.

The first effect produced by tartar emetic is that of sickness: if all the substance be got rid of, no great inconvenience is felt. Its taste is extremely unpleasant, being metallic, or, as it is termed, styptic. It affects the throat and mouth, rendering them sore, producing a feeling of tightness; there is a burning pain about the pit of the stomach; sometimes this pain extends over the whole abdomen, and is accompanied by purging and colic pains. Cramps also are tolerably constant symptoms. There may be tetanic spasms and delirium; and death may occur in the state of collapse. Sometimes its effects resemble cholera. "An apothecary sold tartar emetic by mistake for cream of tartar; the quantity taken was about a scruple (twenty grains). A few moments afterwards, the patient complained of pain in the stomach, then of a tendency to faint, and at last was seized with violent bilious vomiting. Soon after that he felt colic pains, extending through the whole bowels, and accompanied ere long with profuse and unceasing diarrhœa. The pulse at the same time was small and contracted, and his strength failed completely; but the symptom which distressed him most was frequent rending cramp in the legs. He remained in this state for about six hours, and then recovered gradually under the use of cinchona and opium, but for some time afterwards he was liable to weakness of digestion." When tartar emetic produces death, it may occur quickly, in a few hours, or the patient may live several days. This, however, will depend much on the quantity taken. After death, the stomach is found to be affected; also the intestines; in some cases the lungs have been congested, and the brain, it is said, has been implicated. Experiments on animals have shown that the blood remains fluid. Tartar emetic is decomposed by many organic substances, such, for instance, as tannin, decoction of cinchona bark, and these render it harmless by forming with the oxide of antimony insoluble compounds. They are, therefore, good antidotes. After promoting vomiting mechanically, or by giving large draughts of water, decoction of bark should be administered — that of yellow bark (chincona flava) is best; or bark in powder may be employed. Tea, which contains tannin, may also be given; the stomach-pump may, too, be used. When inflammation of the stomach has been obstinate, bleeding has been resorted to. Opium is also recommended. Tartar emetic has been used to detect persons suspected of making free with drinkables which do not belong to them; it has been put into wine and other drinks for this purpose. After what has been said, it will be clear to all that this substance is one which is too dangerous to be trifled with, and that nothing can justify its employment in such a manner.

Chloride of antimony (butter of antimony) has, when taken, caused death. It is extremely corrosive in its action; Dr. Taylor relates cases in which its effects have been very marked. In one case, that of an army surgeon, who swallowed two or three ounces for the purpose of committing suicide, there was entire prostration of strength, excruciating griping pain in the bowels. In the course of a few hours, reaction took place, the pain subsided, and the pulse rose to 120. The patient desired to sleep, and appeared as if under the influence of a narcotic.; he continued in this state, and died in ten hours and a half. From the mouth downwards, the stomach, and the part of the intestines joining it, were black, as though they had been charred. There was hardly any of the mucous membrane remaining, and the parts were so soft that they could be easily torn with the fingers. The treatment recommended when chloride of antimony has been taken, is the same as that for tartar emetic. The analysis for antimony is extremely interesting; because, incautiously, tartar emetic may have been given as an emetic, when other poisons have been taken. As it may be

used, it is especially necessary that the analyst should be careful that he does not mistake small quantities of antimony for arsenic, and that in poisoning by arsenic, where antimony has been administered as a remedy, he should be careful to make a distinct separation between the two substances, if he should find them present. Tartar emetic is usually met with as a white powder. It may be found in crystals; their form is tretrahedral, more often octohedral. These crystals are efflorescent; that is, they slowly part with their water of crystallization, and become reduced to a powder, just as do the crystals of common washing-soda.

—From an Article by F. S. Barff.

Public Murder and Suicide.—Legal prohibitions are framed against the sale of tainted meat and decaying vegetables, but none are found against the vicious architectural arrangements by which tainted air is allowed to accumulate in crowded rooms, halls, and churches from deficient ventilation. People are poisoned daily and nightly by the retained irrespirable gases and animal exhalations whenever they meet in numbers. Judges, jurymen, pleaders, and witnesses, are in this way punished in their court-rooms, alike with the juveniles and their teachers in their school-rooms, the preacher and his congregation, the singers and the crowd collected to enjoy their melodious strains. Why should it not be made a part of the duty of building inspectors to see, not only that public edifices of all kinds shall be so constructed as to prevent loss of life or personal injury by their giving way when completed, but also to prevent by suitable provision for ventilation of these buildings, the bodily suffering at the time, and subsequent disease of those persons who will be collected in them for the various purposes just named? The common defects in the construction of buildings, owing to which their occupants for the time can neither breathe without oppression nor hear what is said or sung, are a positive fraud on the public, who are promised instruction or amusement, as the case may be, but which is imperfectly gained at the cost of comfort and health. One might wonder at this lack of applied science in pneumatics and acoustics being tolerated as it is by the multitudinous sufferers, were they not, in the first case, so generally ignorant of the function of respiration and the requirements for its healthy discharge, and, at the same time, accustomed, in their own houses and lodgings, to imperfect ventilation and its consequences, in headaches, oppressed feelings in the chest, dyspepsia, nervous disorder, lassitude, and debility, from which they suffer on each occasion of assemblage for a short period in public halls. Here again the aid of building inspectors should be invoked. As things now are, it will be found that the inmates of a majority of inhabited houses have neither the requisite number of cubic inches of respirable air in their bedrooms, in which so large a portion of the twenty-four hours is passed, nor proper openings for the continual introduction of fresh atmospheric air, and the escape of that which has become deleterious in the process of breathing and by exhalations from the skin. Just now we need only advert to hospital ventilation, the problem of which has not been satisfactorily solved, although great advances towards this end have been made of late years. In the name of common humanity our municipal governments ought to be loudly and urgently entreated to take stringent measures for preventing the accumulation of crowds of human beings in the rooms of tenement and lodging houses. Murder and manslaughter are punished with all the severity enjoined by law; and what should exempt those parties from infamous punishment, who, speculating on the necessities and ignorance of the poor and the outcast, increase their gains by renting rooms in which these unfortunate beings herd together like cattle collected for the shambles, and encounter nightly the dangers, and at times the reality, of suffocation and its concomitant distresses — ten of the lodgers taking the space and consuming the air that would be a scant allowance for one.

— From an article in Medical Times.

THE OPHTHALMOSCOPE:

What it is, and How it is Used.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

PROBABLY many of my readers have had their eyes examined by an ophthalmic surgeon, or seen him examine those of some friend, with a peculiar form of reflecting mirror called an ophthalmoscope. By means of this instrument the observer is enabled to have a most perfect view of the interior of the eyeball, which, till this invention, was a closed and darkened chamber to the surgeon. Now, that which is within the eye is as much under his inspection as the external parts of the globe. Of course such an assistance to the observation and study of disease entirely revolutionized ophthalmic medicine and surgery, and it has led some of the most brilliant intellects to devote themselves to this difficult branch of the medical profession, whereby very great advance has, within the last ten years, been made in the science of ophthalmology. This has been recognized by general physicians, who very properly do not feel themselves called upon to keep pace with such studies and practice, which they consider must be left to those devoting themselves especially and exclusively to them. All the text-books on physics teach a certain amount in reference to the ophthalmoscope, as if it were an optical instrument to be understood like the microscope. I will therefore endeavor to give my readers some account of this invaluable instrument, and how it was invented, as it is a curious chapter in physics, and they will perhaps only wonder with me that it was not thought out before. It must be remembered that it was not an accidental discovery, but was *thought out*, or invented. It is one of the greatest boons of exact science to medicine, and has directly led to the invention of other optical instruments for the examination of the closed cavities of the human body. Let us see how the study of some of the natural phenomena of the eye gradually paved the way to the invention of the ophthalmoscope.

Probably all of my readers have at some time noticed the pupil of the eyes of our domesticated animals, for instance the cat or dog, light up suddenly, appearing of a bright color, or, as the phrase goes, glaring at you out of the dark or twilight. The pupil of the human eye is simply a round hole through the iris or colored part of the eye. All the media, as they are called, behind the cornea, the aqueous humor, the crystalline lens, and the vitreous humor, are perfectly transparent, so that they do not prevent us from looking through them to see the optic nerve where it enters the eyeball, and the little

arteries and veins coming out from its centre to be distributed to the expanse of the retina on the inside of the globe. There must therefore be some reason for the pupil of the human eye appearing black. Like the animal's eye, however, it also sometimes lights up, or suddenly appears red. This is not infrequent with those people whose pupils are large, as in young persons, or when the pupil has been dilated with atropine. It is so striking a phenomena as to be naturally quite startling, and probably gave rise to the idea and the expression of the eyes "flashing fire." I knew several people in whom I have repeatedly seen this phenomenon. It is, however, due to the same cause as with the animal's eyes. This natural effect was for a long time supposed to be produced by the eye *emitting* light from its interior, with the idea that it was phosphorescent. It will be worth our while to follow along historically this point of the supposed illuminating power of the eyes of animals. Aristotle, amongst those bodies which we now call phosphorescent, included the head, scales, and *eyes* of fishes. Since we now know that the interior of the eyes of several species of fish are lined with a brilliant colored pigment, we easily recognize why they were supposed to have the power of emitting light. Plinius speaks definitely of the lighting up in the dark of the eyes of the nocturnal animals, as the cat. Goats also, and wolves, are mentioned as emitting light from the eyes. It has therefore evidently been for ages noticed that the eyes of the nocturnal beasts of prey light up in the dark. The same form of illumination of the human eye was likewise occasionally observed, the first mention of which is by Fermin in 1796, in the case of an Ethiopian albino. Now and then the same fact was noticed and recorded more especially, of course, with albinos. Naturally enough all sorts of ridiculous and superstitious ideas were connected with this natural phenomenon, some people drawing such a long bow as to say that those in whom it was observed had the power of illuminating objects in the dark, the absurdity of which we shall soon see. In some diseases, also, of the eye, the pupil had been seen to lose its normal black appearance, and assume some peculiar color. Scarpa saw this in 1816. Beer, in 1817, saw a concave yellowish white reflex from deep in behind the pupil. Canstatt, in 1831, relates nearly the same. Behr, in 1839, first spoke of the lighting up of an eye neither albino or diseased. It was a case where the iris was entirely absent. Prof. Brücke, in 1847, suddenly saw the pupils of a young man light up as he turned towards him on leaving the room. Cumming had, before Brücke's observation, shown how the pupil could be made to light up. The first accidental use of the principle of an

ophthalmoscope was thus: Dr. Von Erlach, in Berlin, was sitting one evening in the corner of a sofa engaged in conversation with a friend sitting in the other corner. They were leaning toward each other, and a lighted candle was on the table in front of them. Suddenly Von Erlach saw the pupil of his friend's eye become a bright red instead of black, and noticed that it occurred when the reflection from the glass in the spectacles he wore was thrown on his friend's face. His friend put on the glasses, and also perceived the same effect in Von Erlach's eyes. The latter spoke of and exhibited the phenomenon at a scientific society then holding its meetings in Berlin. It was not till 1851 Helmholz studied the course of the rays of light entering and leaving the eye, and thereby invented the ophthalmoscope.

In 1831 Canstatt seemed to settle the question, and his statement was generally accepted, that the pupil's appearing normally black was due to the black pigment lining the interior of the eye. He said, "this is so clear that it needs no further proof." But here, as usual, truth is stranger than fiction. The idea of the eye being phosphorescent, and emitting light through the pupil, however, prevailed to a considerable extent, and animals were really thought to emit light in absolute darkness. Dessaignes, in 1809, in a prize essay before the *Institut de France*, states, "animals' eyes have the power of lighting up like a flame, in the dark." How the phosphorus got into the eye to emit light, was variously explained. Even Buffon said, "the sunlight which the eye drinks in by day, streams out again by night." Others had the idea that light was emitted through the pupil like the flash from the fire-fly. As late as 1818, Treviranus said, "In both men and cats, the lighting up of the eyes seems to occur more often in summer than winter, particularly at certain times, and with cats, perhaps also at a certain age. The cat's eye lights up when she is waiting in ambush, or meets something strange, or is enraged." "The light comes undoubtedly from the interior of the eye; whether from the retina, and not from the choroidal pigment, experience has not yet decided."

The illumination in the human eye was likewise referrred to phosphorescence. Electricity was also called in to explain this phenomenon. Peter Pallas, in 1811, attributed it to electric light from exposed nerve substance within the eye. About this time, however, phosphorus and electricity had to be given up as the cause of the pupil's occasionally appearing red instead of black. In 1810, Prévost, in the Bibliotheque Brittanique, Vol. 45, published his researches on this interesting subject, of the illuminating of animals' eyes, and

by observations on living cats, disproved the phosphorescence theory. He finally showed that the illumination of the cat's eye, as well as of other animals exhibiting the same phenomenon, was due not to phosphorescence, but to the reflection back of the rays of light which entered the pupil, and therefore was neither dependent on the animal's will, or its state of excitement; that it also did not appear in complete or very great darkness, and that it could in no manner assist the animal in finding its way in the dark. This was of course too simple a truth to be readily received, but Groithuisen, also, in 1810, propounded the view that the illumination was due to the reflection of the light from the layer of pigment in the back of the eye. Groithuisen was completely supported in his idea by Rudolphi, who, in 1821, was the first to call attention to the very significant fact, that a certain relative position of observed and observer was necessary to produce the effect. He showed also that it occurred as well after death as before, the eye in the animal's decapitated head lighting up as well as when the creature was living. He explained the illumination of the albino's pupil, by the rays of light being reflected from the bottom of an eye in which the natural pigment was absent.

Now, when the pupil of an animal's eye becomes thus suddenly brilliant, we sometimes see a red color, at others a green, etc. Esser, in 1826, first distinctly showed that these colors were dependent upon the color of the pigment in the bottom of the eyes of the different animals. He also clearly stated, that if the room was dimly lighted, and the light which came in fell upon the cat, for instance, whilst the observer placed himself between the light and the animal, and looked in the direction of the incoming light, then the pupils were most readily seen to be brilliant instead of black. Johannes Müller, in the same year, 1826, definitely says, in his "Physiology of Vision," that pressure produces in the eyes a sensation of light, which it has been claimed is not only subjective to the person, but also objective to another person, and that the brilliancy of various animals' eyes in the dark has been referred to this cause; but, he adds, this light does not originate in the eye itself, being simply a reflection from the bright pigment in the back of the interior of the globe, the dead animal's eye shining the same as when the creature was alive. The red color was, by Hassenstein, referred to a sudden influx of blood into the part. In 1845, Ernst Brücke published in Müller's Archives his anatomical researches on this point, of the lighting up of the pupils of the eyes of the vertebrate animals. He of course especially studied the living membrane inside the eye, of different colors in various animals, and quite disproved Hassenstein's idea, showing

that the red color from the dog's eye was not due to a sudden influx of blood into the part, but from the *normal* condition of the blood-vessels being filled with this fluid.

In 1845 a prize had been offered by the Medical Faculty of Heidelberg, for a dissertation on this subject, which Kussnal received for an essay in which the principal new points brought forward were, that the pupil is ordinarily too small for sufficient light to enter, and hence it appeared black, and the pigment lining the interior of the globe absorbed the light.

It was not till 1846, that Cumming, in the 29th vol. of the Medico-chirurgical Transactions, explained the pupil's lighting up, and showed how it could be readily done. He said, let a person stand some ten or twelve feet from a gas, or other bright light, the rays from which must fall directly on his face in the line he is looking. A screen placed half way between him and the light, casts off all rays except those coming to the eye. Now, if much light is reflected from the pupil, it will be seen at any point between the lamp and shade. Soon afterwards, Brücke, entirely independent of Cumming, showed how to illuminate the pupil, thus: a person sits in a dark room a few feet from a bright lamp, and looks just over and by it. On the other side of the lamp close to it is a screen, reaching high enough to simply cover the flame. Let any observer, also on the other side, look over the edge of the screen towards the eye of the person observed, and the latter's pupil will be seen bright colored. The relative positions are thus: A, is the person observed, L, the lamp which should be at the height of his eye, S, is the screen to keep the light from B's eye, who looks into A's pupil just over the edge of the screen.

I have thus followed out the history of this interesting subject, as it will be seen how the natural phenomena were studied, and how gradually truth came to light. So far, however, it will be noticed that we only found that it was the light entering the eye which, reflected back, made the pupil light up, and this light was of course of the color of the surface which reflected. This would have been of no special value to the ophthalmic surgeon without further discovery. We need to see the details of the structures within the globe to be able to decide if they are diseased; or, if some foreign body has entered the eyeball, we must see it clearly to decide what it is, and

whether it may be removed, etc. Now the optic nerve, when it enters the eyeball, is a pale yellowish white disk, or a pinkish red, and the blood-vessels of the retina which enter in the centre of this disk, spread out from these in beautiful ramifications, perfectly distinct and clear under the ophthalmoscope, and we shall soon see how this instrument became developed, from all the facts hitherto known. It is, however, a very curious fact, that as early as 1704, Mery, in the Royal Academy of Sciences, had said, he saw through the pupil the blood-vessels in the bottom of a cat's eye, when the animal was under water. In 1709, De la Hire, in the same publication, had explained this fact, and showed exactly how it was caused, by the effect of the water preventing the cornea acting as a convex refracting surface. From that time, placing the eye under water to enable us to see the interior was occasionally practised, as by Prof. Arlt, of Vienna. In 1851, Czermak invented a little instrument for holding water round the eye for this purpose, called the othoscope. It is a sort of little reservoir of glass having three sides, and when placed against the cheek and nose, and filled from above with water, the eye can be kept opened in it under the water. We can look into the eye through the glass in front, and the transparent water.

This brings us now to Prof. Helmholz's invaluable invention, the ophthalmoscope. In 1851 he published a little pamphlet entitled "Description of a Mirror to examine the Retina of the Living Eye." He studied the subject from a purely scientific point of view, and argued thus: if the pupil does not appear ordinarily black because the retina is transparent and the light is absorbed by the black pigment of the choroid, and granting that the choroid and retina both reflect but little light, yet there is the brilliant optic nerve and the ramification of the retinal blood-vessels, which must reflect light to a considerable extent. He said, when we look at a candle flame there is a bright reversed picture of the flame pictured on the retina, just as there is in the *camera obscura*, for the eye is nothing else, optically speaking. The accompanying diagram explains this readily. We see the rays of light going from the candle, and forming a small reversed image on the retina. (*Fig* 1.) Helmholz therefore rightly concluded that it was owing to the refracting media of the eye, the cornea, lens, and vitreous humor, that we could not look into the eye and see the bright inverted image of the candle; a very easily performed and simple experiment will prove this to you at once. Make a little pasteboard cylinder three inches long and one inch in diameter; blacken the inside with ink; now cover one end with a colored card on which you have drawn a small cross, we will say, or a

letter. Let the letter come in the centre of the cylinder. Look in at the other end, and of course we have no difficulty in seeing the cross or letter. Now place over the open end a double convex glass of three inches focus, and try to look through it to see the cross, and you will find you cannot. Looking at it through the ophthalmoscope, you can again see it distinctly. Helmholz studied the rays of light which came back from the retinal picture, and found, as is seen by looking at *Fig.* 1, that they were focused by the eye exactly

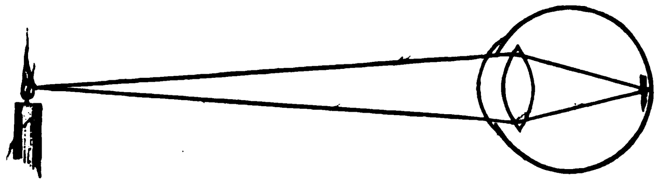


Fig. 1.

where they started from, namely, the candle. Anywhere between the candle and the eye we could see them; but if we put our head there, we *simply stop any light from coming from the candle to go into the eye and illuminate the optic nerve and retinal vessels, so as to render them visible.* This is the whole story, and the only reason the pupil appears black. Here we see, as always, that the simple truth is really stranger than any fiction of phosphoresence of the eye, or the absorption of light by day and its emission by night, or in the dark. The problem was thus reduced down to getting the light into the eye and letting it come back to *our* eye, so we could see the interior of the one we look at. Helmholz solved this in the following beautifully simple manner. He reflected the light into the eye by a plate of plane glass, and the light coming back from the interior of the eye, passed, of course, through the transparent glass, and could enter the eye of the observer placed behind this glass, and he would thus have painted on his retina the picture on the retina of the eye he was looking at; or, in other words, he saw all the details of the interior of that eye. (*Fig.* 2.) This diagram, *fig.* 2, will make the matter quite clear. A is the candle sending out rays of light, which I here represent by a single one, to B a piece, or three pieces, of plane glass, highly polished. These, of course, reflect the light into the pupil of C, the eye we are looking at, and illumine its interior. Now every illumined object sends out rays of light in all directions, and those passing back through the pupil, as I explained with *fig.* 2, go to the reflecting surface, and from there back to the candle; but this reflecting surface is trans-

parent, and some of the rays must pass through it, so that our eye, if just behind and in a line with them, as D is, then they can enter our pupil, and thus on our retina will be depicted all the details of the bottom of the eye we desire to examine. Such, then, was Helm-

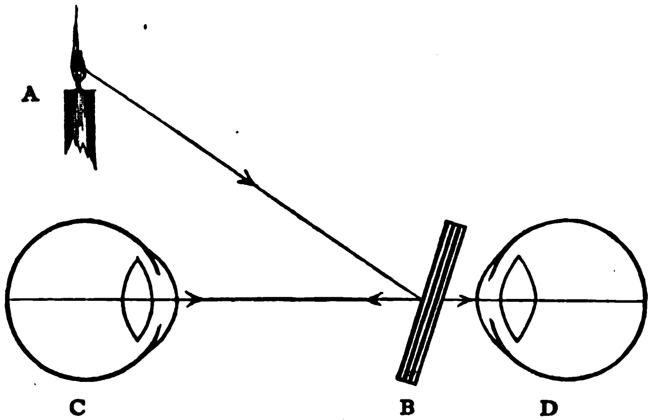


Fig. 2.

holz's invention, and such its beautiful simplicity. Afterwards Prof. Ruete invented another form of reflecting mirror of polished steel or silvered glass, and to let the rays into the observer's eye, he made a *small hole in the centre*, through which they passed. A piece of looking-glass with a little place on the back where the silvering is scraped off, will represent such an ophthalmoscope.

There is much more of optics and the laws of reflection and refraction of light applicable, and to be understood in the practical use of the ophthalmoscope. These the ophthalmic surgeon must master completely, to be able to use this instrument to any advantage. Of course, as soon as the mystery was solved and the way pointed out, there were a variety of means devised for attaining the desired object of illuminating and observing the interior of the eye. They are, however, of no special interest here. I will merely mention that there is a form of ophthalmoscope by which we are enabled to use both our eyes, and thereby get a binocular or stereoscopic view of the interior of the globe. Another, somewhat on the principle of the "ghost" used in the theatres recently, enables the teacher and student to see the details of the bottom of the eye at the same time. Still another enables one eye, for instance, the right, to examine the inside of the other, or left. And finally a very simply arranged ophthalmoscope enables an eye to *see its own interior*, the optic nerve and ramifications of the retinal vessels. This is as far as

science has at present gone in this direction. We see now how pure science and its cultivation leads directly to the most wonderful, invaluable, and *practical* results. Never, then, let us speak of science lightly or sneeringly. So-called self-made men don't invent ophthalmoscopes, it comes from years of hard work, with toiling brains and patient study and industry. As may be well imagined, the ophthalmoscope was soon employed all over the world, and the study of the diseases of the eye quickly rescued from the hands of those who only too often were mere charlatans. It moreover, as I have above said, induced such men of talent to pursue the specialty of ophthalmology, as to lead at once and directly to still further and most eminently practical discoveries, such, for instance, as those of Prof. Donders on the refraction and accommodation of the eye, and hence the proper means of selecting and adapting spectacles, a boon hundreds of thousands are now reaping the benefit of. Thus my readers will see that an ophthalmic surgeon cannot be an ordinary quack, and must have a scientific education, and pursue his specialty with unceasing assiduity.

But still further, Prof. Helmholz, in his original little pamphlet, modestly says: "I think by means of the ophthalmoscope we shall be able to determine the optical condition of the eye, independent of its visual power, and the statements of the person examined." This is in reality just what, during the last two years, the scientific ophthalmic surgeons have been doing, and I confess it is to our discredit not to have done it before, as nearly twenty years have elapsed since Prof. Helmholz told us how this could be done. By examining the eye with the ophthalmoscope we find out directly what glass is required for the patient, and can select it within one or two numbers, this in spite of anything the patient may say or do, should he be disposed to deceive us. This, my readers will see, is very different from the only too frequent method of the venders of spectacles letting their customers try on one after the other, and pick and choose for themselves. Optician and ophthalmic surgeon, or oculist, as the community designate us, are two very different persons. The best opticians follow the directions as to the number and setting in the frame of the patient's glass chosen and tried by the ophthalmic surgeon, just as the respectable apothecary follows the direction of the physician in compounding the medicine prescribed. I have elsewhere perhaps sufficiently warned against the dangers of the indiscriminate choice and wearing of spectacles, tinted glasses, et cetera.

The seeds of repentance are sown in youth by Pleasure, but the harvest is reaped in age by Pain.

WHAT TO EAT.

We must always bear in mind that a bullock is an animal capable of anatomical, and therefore gastronomical division. . As the tenderness of the meat depends partly on the anatomical relations, it follows that those muscles which are least called into action are always more tender in fibre, and therefore more easy of digestion. Again, the tenderness of meat will greatly depend upon the proper length of time which it is has been allowed to hang before cooking—a fact which most housewives well know, but few put into practice. This hanging process slightly separates the muscular fibres, and also develops some stimulating properties in the meat. Indeed it is the first step to decomposition; but it really renders that same joint tender which, unhung and fresh from the butcher's stall, would set the jaws of the whole family aching. Let the butcher, therefore, be asked when the meat was killed, and let it be hung in accordance with his answer. In cold weather meat will keep for five or six days; but in close, summer weather it must be cooked the day after it has been killed. However, in this matter, as in all others, experience is the best guide. Let the meat hang long enough to be tender but not long enough to degenerate, for tough meat will give rise to indigestion, and putrid meat to diarrhœa; and this last fact ought to be kept carefully in mind by those whose bowels are easily relaxed, and by convalescents from fevers or exhausting diseases. Game is generally supposed to be tender, nourishing, and light food, and therefore a suitable forerunner to butchers' meat; but let the partridge or grouse be served "high," and an attack of diarrhœa will be the almost inevitable and disappointing consequence.

As some housewives may not always wish to receive the butchers' statements as so many axioms or self-evident propositions, the following data on the quality of meat may be interesting, and perhaps useful. The fat should be fair in quantity but not excessive, for an excess of fat lowers the proportion of albuminous food; and as physiologists tell us that albumen is a very fine thing in the way of nourishment, those who wish to be well fed cannot possibly get along without it. Again, the fat should be firm in consistence; not yellow enough to remind one of a sunset, nor streaked with blood. On the other hand we must not forget that oil cake will sometimes give a yellowish tinge to the fat, though even then the color will be of a healthy yellow. The flesh should be firm, elastic, and never tough. When pale and moist it is that of a young animal; when dark-colored, of an old one. Let a piece of meat stand on a clean white plate, and if good and fresh there will flow gently from it for some five or six hours a reddish looking juice. If a knife is run across the meat there should be no lividity or marbling, and the deeper layers of muscle should be of the same character as the upper, though perhaps of a paler blush. The tissues that lie between the muscles should be free from any mucilaginous fluid, and should be tolerably firm in texture, as softness and excess of moisture imply that putrefaction has set in, especially if the tissues tear easily when stretched. More prominent signs of putrefaction can be detected by any ordinary eye, and therefore need no comment.

Again, too, as to variety, though there are fifty different ways of cooking beef and mutton without exercising any great ingenuity, there are also 365 days in the year, and to the stomach as well as to the mind variety is charming. Let it, therefore, be studied with judgment. Some may object to variety, arguing that to multiply dishes we must of necessity make them highly seasoned and indigestible; but good judgment and a perceptive palate will avoid all excesses in either greasy or stimulating ingredients.

If we are to consider the comparative digestibility of different kinds of meat, we shall find that mutton heads

the list in the possession of this amiable quality. Next follow venison, hunted hare, pigeons, partridges, pheasants, larks, grouse, and young chickens. Can we grumble when prairie and woodland send us such profusion of material for choice? Then next in order follows beef, in happy fellowship with lamb; and here let us pause for one moment to remark that the flesh of young animals is less easily digested than that of full grown. Lamb is dear and a delicacy, but mutton is reasonable and to be relied on by the dyspeptic. Why should we pay from eight to ten cents a pound more for the chance of an indigestion, when we can save our money and our stomachs at the same time? There is a certain amount of false pride mixed up with the consumption of lamb. It is from twenty-five to thirty cents a pound while mutton is only from fifteen to twenty. Therefore you can ask a friend to sit down to the former with an air of confidence when you would have blushed to have said, "I fear that we have only mutton for dinner to-day." Indeed, at times, lamb is less delicate and toothsome, not to say nutritious and digestible, than haunches of mutton, and, like all young meat, requires the stimulus of mint sauce to balance the occasional insipidity. Let us not, then, be the fools of fashion in this respect. Eat daintily if you will, but with judgment.

Turkey, as poultry, takes the precedence of beef and lamb; and, for quality of meat, a hen bird not too gigantic in form or sinewy in structure should be chosen. A slice from the breast is choice enough for a prince's palate, and tender enough for a connoisseur's digestion that happens to be weak. A turkey that weighs 40lbs. is pleasant to talk about and comely to behold, but is, nevertheless, a gastronomical fallacy. Rabbits to some are an agreeable change from the dull routine of butchers' meat, but the accessories should not be too rich. Ducks, geese, woodcock, and snipe are pleasant but doubtful fare, and must play subordinate parts in the dyspeptic's *role de cuisine*. We must remember that the meat is very firm, and that the fats and juices are very rich, never forgetting that with ducks and geese the seasoning is "perilous stuff," and apt to weigh upon the bosom rather more heavily than bargained for by the consumer. The apple-sauce and lemon-juice are only correctives to the richer combinations presented by these birds when cooked. The acid is the natural contrast to the fatty elements, and it is wise to add them. Currant-jelly with rabbit and apple-sauce with pork are physiological refinements, and justly to be commended.

Before we go farther with the dinner it would be advisible to touch on the subject of soup, for though this liquid food stands first in numerical order of dishes served, we must place it in the second rank of foods to be digested. It has its advantages and its disadvantages — its admirers and its despisers; so let us take note of its virtues and its defects. As it is but natural to look on the sunny side of affairs first, we will begin by pointing out its chief merits. It is concentrated food, an advantage to those whose time is precious; it requires no mastication, an axiom rather valued by those who have aching teeth or none at all; it can be the happy medium for introducing many pleasant accessories, either in the shape of sauces, or vegetables, when the same additions in other forms might not agree with, or be palatable to, a weak stomach. When, however, the mucous membrane of the stomach or bowels is irritable and requires rest, then will a simple, unspiced soup be most grateful fare. Finally, it *can* be made a most economical form of food, and the economy of soup dinners has yet to be learnt by our cooks.

Abroad, *cela va s' entendre sans dire*. At home cooks are, as a rule, wasteful from pride and ignorance, and mistresses are too careless, and frequently too ill informed in household matters, to correct these abuses. We are delighted to *read* of the domestic difficulties of Dora in "David Copperfield," but few of us would care to *experience* them in our own homes. Nevertheless hundreds of young married couples put

up with as much roughing as soldiers in a campaign, merely from lamentable ignorance of household arrangements on the part of the otherwise charming wife. "How I *mis*managed my house on $1,000 or $2,500 a year" would be the appropriate title of a true account which young housewives might often furnish of their first or second year's domestic doings.

The disadvantages of soups are that their long continued use, though soothing to an irritable mucous membrane, yet weaken the muscular fibres of the bowels, and thereby give rise to indigestion — an indigestion which is more difficult to meet inasmuch as the cause is often unsuspected. In the celebrated case of St. Martin, Dr. Beaumont noticed that half an hour after St. Martin had dined on beef soup, the absorption of the watery part had gone on so fast as to leave the remainder of even a thicker consistence than after an ordinary solid meal. It would not surprise us, then, if this "too solid" remainder caused some twinges of indigestion. A good plan, therefore, in making soup for delicate stomachs would be to add some solid materials, as vermicelli, macaroni, pearl barley, rice, and bread, that shall rather arrest the too rapid absorption of the liquid food. It is useless to condemn liquid food entirely, or even to banish it from our own dinner table as a needless accessory. Physiologically it may have great value for those who hurry to and from their meals, as it allows an interval of comparative rest to the fainting stomach before the more substantial beef and mutton is attacked, rest before solid food being as important as rest after it. Let a hungry and weary merchant or lawyer rush in *medias res* — plunge boldly into roast beef, and what is the result? The defeat is often as precipitate as was the attack.

When the body is weary the stomach must be identified with it, and cannot therefore stand the shock of some ill-masticated half pound weight of beef. But if a small plateful of light soup be gently insinuated into the system, nourishment will soon be introduced, and strength will follow to receive more substantial material. After long fasts and long walks nothing is so common as sudden indigestion. The walk is taken with a view to gain an appetite, but it too often destroys it by weakening the nervous energies. A few mouthfuls of soup with a crust of bread is to the faint and hungry more commendable than a pyramid of beef and potatoes.

Soup leads so naturally to fish that we cannot do better than discuss them next. The white-fleshed fish are the easiest of digestion, and are therefore most suitable to weak stomachs and convalescents from illness. The red-fleshed, on the other hand, are firmer in texture, and contain a larger proportion of oil. This firmness of fibre it is that makes them more difficult to digest, while the oiliness is so much gall and bitterness to the bilious. Flounder are the convalescent's true friends; cod are his occasional friends; mackerel are doubtful friends; salmon and eels are his sworn enemies. Trout are delicate and occasional fare, and are to be relied on. I will not touch on the faults or virtues of shark or whale, as, like the elephant chops ordered by the Yankee traveller, this would imply an order for the whole animal. Oysters fresh from the shell are light and nourishing, but if you cook them you convert the light into the indigestible; if you leave them to die and get only slightly "turned," you have decaying matter. When autumnal diarrhœa is prevalent, the dead oyster might make unpleasant retaliations on its consumer; so beware! Lobsters and crabs are ornamental to a degree in their scarlet "liveries dight" when they flank a supper table, but the stomach must indeed be encased in *robur et œs triplex* that can engage in their consumption. It would be well for those of weak digestion to avoid these seductive crustaceans. Salted fish, though appetizing as a rule, is not easy of "appropriation," and should therefore be eaten at breakfast rather than supper. Neither shrimps nor prawns are safely to be trusted.

AVARICE is the parent of crime.

CONDIMENTS.

THE professed cook would fare ill without his mustard, his pepper, and other tasty things whereby he makes his nutritive dishes palatable. It is hard to assign any definite value to some of those things, whereas one at least, common salt, is of real dietetic importance. In American climates, and with American food, it is hard to do without it, and although certain uncivilized races have not common access to this valuable compound, yet, whenever procurable, they consider it a luxury. As for pungent vegetable condiments, such as mustard, ginger, and generally the spices, probably mankind in a thoroughly simple state of nature would be all the better without them; but once accustomed to these things, a human stomach demands them. In respect to some condiments, the taste for them is universal. The appreciation of mankind has never changed in respect to common salt, or if we choose to be chemical in our language, the chloride of sodium. As to others, opinions widely differ, not only as to various races, but for the same race at different times. Thus, looking back into English cookery-books of ancient date, we find ginger once used as a spice condiment on occasions no cook ever dreams of now. At this time we chiefly use ginger to flavor a few drinks. It certainly does enter into some kinds of curry powder and paste, but with this exception we are not aware that it is ever used for meat-flavoring. Far otherwise in the time of the Plantagenets and Tudors; then ginger was made to impart its pungency to joints, poultry, and entrées. We should now deem this use of ginger repulsive; but our ancestors seem to have liked it well, otherwise they would not so continuously have used it. Saffron, again, is another condiment almost wholly gone out of use, though much employed in the English cuisine formerly. Yet from the thirteenth to the sixteenth century saffron entered into the composition of meat viands with a frequency at least equal to what pepper does now. All the spice condiments proper come from the islands of the East-Indian Archipelago, and hence must have been very dear in Europe before Vasco de Gama doubled the Cape of Good Hope, and thus threw open to navigators the magnificent resources of the Indian Sea. Before that time Venice monopolized the spice-trade in its then limited proportions. Pepper, cinnamon, and nutmeg, mace, and cloves, were then condiments for the rich alone, being nigh unobtainable by the middle and lower classes.

Salt. — Its generality and importance regarded, common salt undoubtedly takes first rank among condiments. Almost every animal tissue contains it in small quantities, and nearly every vegetable. The enormous quantity of salt held dissolved in oceanic water may be imagined, though many salts other than common salt impart to sea-water their distinctive flavors.

The earliest notice of common salt occurs in the Bible (Genesis xix. 26; Leviticus ii. 13); Homer refers to it in the ninth book of the *Iliad:* wherefore the testimony of its use as a condiment is very ancient. Taken all in all, the most important source of common salt is the ocean, from the waters of which it can readily be separated uncontaminated by its foreign associates. Some nations obtain the whole of the salt they consume from sea-water. Depositions of salt have been found in every geological formation except the oldest stratified rocks.

The rock salt used in this country is imported from England and the continent of Europe, while the only absolutely pure salt is obtained from Germany.

In certain very cold countries sea-water is concentrated by freezing, during which process only fresh water turns to ice, whilst very strong brine is extracted; this needing only a small amount of artificial heat to effect crystallization.

Mustard.—To most palates mustard is agreeable, and physicians are agreed as to the matter of its dietetic use. Mustard was employed in medicine by Hippocrates, and is thus sometimes employed by European doctors now. The medicinal value of mustard, however, is inconsiderable by comparison with its value as a condiment. Two sorts of mustard-plants are known, the white and the black. Both are indigenous to England, and both extensively cultivated for the mustard manufacture. One point cannot fail to have impressed itself on those familiar with mustard as prepared in different countries. Thus, whilst the mustard of France and Germany is so mild that it may be spread on bread and eaten with hardly more inconvenience than so much butter, the mustard of England has a pungency altogether forbidding that sort of ingestion. Some of the difference between continental and English mustard depends, no doubt, on the presence of adventitious things, but in some degree it is attributable to modification of a very curious fermentive process which crushed mustard in the presence of water, or even aqueous moisture, undergoes. There is a good deal that is very interesting and complex about the chemistry of mustard — nobody will have forgotten how extremely pungent mustard becomes when mixed with water and agitated. This pungency is due to the presence of a volatile oil; yet in the mustard-seeds themselves, whether white or black, there is no volatile oil; the presence of which is referable to a peculiar sort of fermentation. Comparing English mustard with samples manufactured in France and Germany, the brighter yellow of the former will have been remarked as a characteristic, in addition to its superior pungency. This color is given by turmeric.

Pepper.—Whether pepper as a condiment be next in importance after mustard, or whether it should not even take precedence of mustard, is a point admitting debate. This may be procured under the two designations of white pepper and black, as is well known; the distinction, however, not being in the botany, but the mode of preparation. Pepper white and black come from the same plant. All pepper is black originally as it comes to us, but the blackness resides in a superficial skin. If the berry be ground entire, then of course the powder, or rather grains, will be dark-colored; but if the cuticle be removed previous to grinding, then the ground result will have a tint more or less approaching white, though never quite white; in this consists the only difference between white and black pepper. So-called cayenne-pepper, it is well to know, is not pepper in any true sense; not being the product of one of the piperaceæ, but of capsicum, a member of the solanaceous or nightshade tribe.

The black-pepper plant is indigenous to both the East and West Indies; it also grows in Sumatra, Java, and other islands of the Indian Archipelago. The plant is sometimes called a 'vine,' on account of its climbing habit, though having no botanical alliance with the grape-vine. It grows from eight to twelve feet high; the color of the peppercorns is first green, then red, being attached to terminal flower-stalks or spadices. The berries, so soon as they have turned red, are dried in the sun; and when dry, their stalks are separated by the hand. The pepper-plant begins to produce about the third year, but only comes to perfection in the seventh. It continues to be productive during three or four years, then declines for about as many more, until it ceases to be of any value. Two crops of berries are produced in the year, but the seasons of ripening are very irregular. If wholly unadulterated pepper be required, it should be purchased whole, and ground in a domestic mill. Bought in the state of powder, it is almost invariably adulterated; special ingredients being sold for this purpose. In addition to the ordinary peppers — black and white —of domestic use, there is another kind, called long-pepper. The fruit of this sort is not shaped as berries, but as elongated cylinders with rounded ends. Long-pepper tastes much like ordinary white and black round-pepper, but is of more

use as an ingredient of cattle medicines than as a condiment for human stomachs.

As regards capsicum or cayenne-pepper, I have already stated that, not being the produce of a piperaceous vegetable, it is not a pepper in any botanical sense. Nevertheless, in deference to its usual name, we may as well get it out of hand at once. Of capsicums there are various species, all belonging to the natural family of solanaceæ, or nightshade plants; the same family to which the potato appertains, also the tomato. All the nightshade tribe are either poisonous, or they have a tendency to be poisonous; to this even the potato is no exception. The two chief capsicums used for the manufacture of cayenne-pepper are the *C. annuum* and *C. frutescens*, the latter species yielding the best sort. Capsicum annuum is a native of America, but is also cultivated in the East Indies, and to some extent in English greenhouses. In tropical climates it may be regarded as a weed growing almost everywhere, on all varieties of soil. The capsicum frutescens is ordinarily known as Guinea or bird-pepper. The pods of this sort are small, scarcely an inch in length, very narrow, and of an orange-red color. The pods are somewhat more hot than those of the kind just indicated, and, moreover, are somewhat aromatic, which the others are not. The pods of either of these, together with other species of capsicum, constitute, when ground, cayenne-pepper. The ruddy tint of fresh-grown capsicum soon dulls and becomes unattractive when ground and exposed to light, hence genuine cayenne-pepper ought to be very dingy in appearance. Whoever chooses cayenne-pepper for its ruddy fresh tint makes a great mistake. It is then almost sure to be contaminated, perhaps with red-lead, or perhaps, still worse, with red sulphuret of mercury. Red brickdust has also been found in many of the samples of cayenne-pepper purchased in low neighborhoods. Salt, sawdust, mustard-cake, rice, red ochre, all these things have been found in spurious cayenne-pepper.

GINGER. — We now pass to ginger, which takes high rank. Ginger belongs to the natural family of zinziberaceæ, and is not the root, as ordinarily stated, but an underground stalk, called by botanists a rhizome. Ginger is produced in the West Indies, more particularly Jamaica; the East Indies, China, and Sierra Leone. In commerce, ginger is distinguished into black or coated, and white or uncoated; these not being the produce of different plants, but of the same. If the skin or epidermis be allowed to remain, then we have black ginger; if removed, white ginger: moreover, to increase the whiteness, bleaching is sometimes had recourse to. The taste for ginger as a condiment is very prevalent, though, as already remarked, the way of using it differs greatly from that adopted by our ancestors. They used it in meat sauces, as we have seen; we restricting it mostly to the use of flavoring beverages and certain sorts of pastry. Preserved ginger needs no eulogy, it being a most agreeable sweetmeat. The best sort comes from Jamaica, an inferior sort from China and the East Indies. Ginger rhizomes, used for preserving in sugar, ought to be green and succulent; however, a very good preserve can be made with ordinary dry ginger, by following a peculiar treatment. If the rhizomes be steeped for some weeks in a solution of weak carbonate of potash, and when soft transferred to strong syrup, the result will be a preserved ginger leaving no great room for complaint, though inferior to the renowned sweatmeat of Jamaica. Pungent as ginger is, one would hardly have expected insects to attack it. They do, nevertheless; the rhizome being frequently worm-eaten.

Answer to W. — Imperfectly shaped or badly growing finger-nails is due to the following causes: — 1. Inherited syphilis; 2. Inoculation of pus; 3. Previous improper medication in infantile disease; 4. Lack of absorption of fat by the intestines from some cause; 5. Want of proper or correct nourishment.

CONSUMPTION.

General Pathology of the Lungs.

BY CARL BOTH.

THE physical or natural laws by which the universe is governed are invariable and absolute in their operation, and hold in subjection and under control the mere molecule, as well as the grandest structures of creation. A law of nature, therefore, is one which does not admit of exceptions in any case, but is always, in all cases, and under all circumstances, absolute and infallible; and consequently any law, or supposed law, which does not fulfil these conditions, cannot be a law of nature. But to discover and to demonstrate the laws of nature, is the great and sole object of science. One of the primary laws of nature is, that there is no absolute immobility, or cessation of motion, in any part of, or in the whole of the world. Our senses, it is true, may not be sufficiently acute to enable us to perceive a motion, but there is one, notwithstanding. What we call death, is a relative expression referring to a change of form; but real or absolute death has no existence anywhere, except in name. If the evolutions among the elements which constitute everything, go on with a certain steadiness to our observation, we speak of such a condition of things as being *normal*. But if a change occurs in this apparently usual current of things—the cause of which may or may not be known—we speak of this changed condition of things as being *abnormal*; although, in reality, there is nothing abnormal about it, except in *appearance*. As everything in nature is governed by fixed and absolute law, there can be no such thing as an evolution, a change, or development, outside or independent of it; and, therefore, nothing that is strange, incorrect, or abnormal. The vanity of ignorance, however, in connection with feebleness of conception, the circumscribed area or field of observation, and the folly of men in considering themselves as being outside of the laws of nature, has been the occasion of introducing into our dictionaries a class of words of which disease, abnormality, corruption, etc., may serve as representatives. The various changes of the kind referred to which take place are but the result, or consequence, of some influence of motion, which may, or may not, be known. Hence, in point of fact, such a *thing* as a disease has no existence; that which is usually so called, being only an unusual phenomenon to us, produced by certain causes, which to discover is our object, and which to demonstrate, in reference to Consumption, is our present purpose.

The object of the various branches of science is to recognize and understand the laws of nature; which, being universal, are the same everywhere. And hence medical science has for *its* object the recognition of these same laws in connection with the human organism, and the various *branches* of medical science, the application and use of them in the smallest details of the body. That particular part of medical science which treats of the unusual, or to us abnormal conditions under which these laws manifest themselves, is called

pathology; — that which has reference to the laws that are applicable to all parts of the body being termed *general*, and that which has reference to the laws which apply to one condition only, *special pathology*. The general pathology of the lungs is consequently the same in principle, as for other parts of the body.

The life process, under certain and mathematical laws, requires a constant, equal, and uninterrupted motion of all molecules belonging to the organism; we therefore call that process which occurs when one or several molecules, for some reason, are prevented from following these laws, the primary cause of any and every disorder or disease. This interruption of motion (*Stasis*) would constitute the primary irritation (*Reiz*), which would be followed in each and every case by such consequences as the circumstances would permit. These consequences constitute those conditions which come under our observation, and are called by different names, according to their different appearances, and the places and organs where they show themselves.

The condition of science at the present day is not such that we can account, with certainty, under all circumstances, for the primary cause of the stagnation of molecules; and more especially, as they but seldom exhibit any symptoms sufficiently strong and marked to be noticed by us. We shall therefore pass from the molecules to the smallest organisms recognized by us, — the cells. Any disconnection, dislocation, stagnation, or injury to one or to several cells, constitutes, then, so far as our present purpose is concerned, the primary cause of disorder. But we distinguish between fixed and movable cells, the first being less exposed to injury than the last; hence the movable, or blood-cells, are, for us, the most important subjects for observation.

When and wherever the free circulation of the blood, in any part of the body, is interrupted for a certain length of time, coagulation and obstruction, as well as enlargement of the vessel in question, in part or in whole, must, of necessity, take place. And whether this may happen to refer to an artery, vein, lymphatic, or capillary-vessel, the principle is the same, though the appearance and the names of such conditions vary according to the parts affected. The cause for such interruption of circulation may have its origin in the vessel itself, or in the blood — mechanically or chemically — or through the nerves governing the vessel, or it may be caused by external injury, or by too much or too little pressure upon the vessel. The consequences arising from such an occurrence, will vary materially according to the size and strength of the vessel, to the more or less resisting power of the tissues around them, to the state or condition of the resisting power of the body in general, and to the extent of the force with which such obstructions may generally have to meet. This process was known by certain symptoms long before it was understood, and was called *inflammation;* a definition which to-day has no especial or definite meaning. In order to make it impossible to be misunderstood, and at the same time to show how independent science is of mere names, we shall not use the old phrases, but

describe the condition, and then attach the old name, instead of making the name first, and afterwards fit the thing to the name, as has been the usual custom, not only in medicine, but in all departments of thought.

We have learned that the blood from the right heart must pass through the lungs to reach the left heart; the quantity of blood thrown into the lung must, therefore, stand in exact proportion to the capacity of the lung to admit of its passing through, or otherwise the machinery must get out of order. Everybody knows that the heart does not beat the same at all times; but that anything in the way of excitement, or of unusual exercise, sets it to work faster and faster, and that under such circumstances, one is obliged to breathe deeper and quicker. That there must be an intimate relation between the beating of the heart and the respiration, is thus most easily and clearly demonstrated. Nature has given to us three times as much lung as is required for use under ordinary circumstances, in order to meet the exigency arising from the extraordinary amount of blood which, under certain conditions, is pumped into it by the heart; and if this superabundance of lung was at all times ready for use, it would be almost impossible to injure this organ. But this is not the case with very many; take, for example, the clerk who is confined to his desk, or the fashionable young lady, who, through the whole summer long, never brings into full exercise the whole body. Winter comes, and with it the usual gayeties, amusements, etc., of the season. The ball-room is frequented, and the whole night, or a large part of it, is spent in dancing. A single dance cannot be missed, although already fatigued and out of breath; and consequently the pulse is raised from eighty or ninety to one hundred and forty, with full beats. The next morning a very slight soreness is felt in one part of the chest, but not enough to be minded. One or more capillary blood-vessels have been ruptured in one of the small lobuli, and a little (perhaps a teaspoonful) of blood has escaped into the elastic tissue, that is all! There is no symptom other than the very slight soreness, which is gone in a few days. Another ball, etc., is attended, and a few days afterwards what is termed a slight cold is experienced, — caused by an east wind or the damp ground! Some soothing medicine is taken, in connection with quiet rest for a few days, and the cold is gone; — though not entirely. And so the winter is passed; the health is good, only there is a greater susceptibility of taking cold; and hence the cold is more frequent, and each time a little worse; — still nothing alarming, the doctor says. The next summer the Springs or White Mountains are visited, with a view of cure from the change. The hops, parties, and rides are all enjoyed, and home is finally reached, with the belief that health is fully restored. But somehow another cold is taken, and the climate is changed to avoid this or that wind. From the general appearance, feelings, or appetite, there is not much to indicate any serious difficulty, although, it is true, there is occasionally a little cough. Sometimes there is a somewhat severe pain in the chest; but it yields to a plaster, or to croton oil. But all at once a bad-looking phlegm

is raised, alarm and anxiety is felt, and a competent physician called to examine the lungs, who pronounces the difficulty *Chronic Pneumonia*. The little blood which had escaped from the capillary vessels into the elastic tissue two years previous, had remained there all the time, and come up as pus, after having penetrated the alveoles, and poisoned the surrounding healthy tissue.

Thus one of the worst kinds of Consumption is developed. Take another example, by way of illustration. We observe a young man or woman who never goes to dances, but engages in study or business with intense interest and close application. The school-day or college-life is closed with graduating honors, and a position sought for in the world. From early morn to eve the chosen profession or calling is pursued with ambitious and tireless energy. The day's labor or engagements finished, the evening is spent in reading books of interest and profit. As a steady and good son or daughter, great care is taken in reference to the health. Wet or damp feet are always avoided by proper caution, the closing of the windows to avoid a draft is never neglected, and nothing is overdone either in living or in pleasure. The character stands very high in the community, and the good-will of all is secured; but the remark may be occasionally heard, that it is too bad that the countenance should look even a little pale. There is nothing specially indicating that the health is not good, — only sometimes a little flush of heat is experienced, and in the absence of which a slight chilliness is almost always felt, and consequently perspiration very seldom, if ever, takes place. There is not too much flesh, but too little; and the collar-bones are rather prominent, or stand somewhat too much out. There is not much vigor or strength, to be sure, but so far as the feelings are concerned, there is nothing to indicate that there is anything wrong. A cold is caught some day, without any known reason for it, and is followed by a dry, hacking cough, which, however, is slight. Some medicine is taken, and the cough disappears, but comes on again in the spring with increased severity. Cessation from business and a journey is recommended by the attending physician, as most likely to prove beneficial. The advice is followed, and the health apparently wholly restored. But a year or so after, another cold, a little worse than the first, is taken, and some day a small streak of blood is observed in the phlegm which has been raised. Anxiety and alarm are experienced, and a most thorough examination of the lungs is at once submitted to, which results in the assurance that there are *tubercles* in the points of them.

In the one case, the lungs were injured by having too much blood thrown into them under certain conditions, while in the other, they were injured by having too little thrown into them. By steady confinement without proper and sufficient relaxation, and recreative enjoyment, the upper points of the lungs were allowed gradually to collapse. In ordinary life the upper points of the lungs are but seldom used, and therefore the exchange of gases through the alveoles is not effected. Nature, however, has provided that the carbonic acid gas, when accumulated in the alveoles, shall irritate the respira-

tory nerves, and produce an occasional deep inspiration, a deep-drawn sigh, which is nature's preventive against tubercle formations. Still the continued inactivity gradually lessens the irritation, as well as the amount of the gas in the alveoles, until permanent collapse takes place; the immediate consequence being, that the blood moves slower and slower in those parts, and the more so, as but a small quantity is thrown there under any circumstances.

As a result of insufficient exercise, air, and sunlight, there is an increased proportion of white blood-globules to the red ones; and as these white ones, as has been shown, move on the walls of the vessel, and slower than the red ones, an obstruction, or stoppage in the capillary vessels of the neglected part, will consequently occur in a given time. And under such conditions, the capillary vessels will gradually become enlarged at the point of obstruction, and by final rupture permit the escape of blood-globules into the meshes of the tissue where they remain.* And since this process is very gradual, and the pressure of the blood in the vessel proportionably a very small one, the amount of escaped blood is very small, filling only one, or a few meshes of the elastic tissue. This is the primary or real tubercle, the formation of which occurs ONLY in the *points* of the *lungs*, *and for anatomical reasons* (no part of the body being exposed to loss of pressure so directly as the points of the lungs), *nowhere else in the body*. When blood-globules escape into the tissues in which the normal pressure remains, they may be reabsorbed, provided the pressure upon them is strong enough; in which case the liquid is pressed out of them, leaving their hulls with a portion of the pigment, which can afterwards be found on such places. But in the lungs thus affected, the necessary pressure being lost, no reabsorption can take place. The red globules which have escaped, first lose their color and become whitish, while its solid elements coagulate. They are then observed to be grayish, having different shaped bodies, granules, in them. This is the gray tubercle. Under favorable circumstances these cells change into fat cells, and then show nothing but a yellow contents, without granules. The

*In 1857, when the writer was engaged in finding the ending of the filum terminale in animals, and in man, under the direction of the celebrated neurologist Stilling, in Cassel, Germany, the escape of the blood-globules into the tissues (now known as Cohnheim's discovery) was observed. In 1860, in a private lecture at Meionaon Hall, before the physicians of Boston, the fact of such escape was demonstrated in its application to the formation of real tubercle, but without being understood. In 1863, when the cellular theory was yet unknown in Boston, the same facts were again demonstrated before the Suffolk District Medical Society of Boston, but with no better results, the views advanced being duly laughed at, and by an unknown "FRIEND," in *The Boston Medical and Surgical Journal*, who, conjointly with its editors, not only treated it with absolute contempt, but demanded the *expulsion* of the writer from this remarkable society, which, from the history of former times, is doubtless the proper treatment for any medical man who has the audacity to advance opinions, the results of long and hard labor, and of original discoveries, which are in advance of those held by his colleagues, with a view to improve and extend the knowledge of the profession. The view which has been advanced by Cohnheim, of the escape of the blood-globules through the meshes, or stomata, the writer entirely disclaims, maintaining that they can escape *only by the rupture* of the capillary vessels; the application of which fact in tubercle formations was first made by himself. (See *New York Medical Record* of Sept. 1st, 1868.)

most favorable metamorphosis is their drying up, and becoming saturated with lime, forming them into a petrified mass. This is the calcified tubercle, a form from which no future danger can arise, and which we call a healed or arrested tubercle. If, on the other hand, circumstances are unfavorable, the gray cells decay by putrefaction, and not only become totally destroyed, but infect their neighboring tissue cells, and irritate them to new growth of imperfect cells, which decay as they develop, until the mother cell itself perishes. Such a process, carried on in any part of the body, becomes very dangerous; for as soon as these putrified masses reach a yet healthy blood-vessel, they coagulate, obstruct, and poison the blood in said vessel, by penetrating it. Small pieces of clotted blood, or diseased cells, are carried along with the blood-stream, and get caught in some other part of the body, when the same process of blood poisoning is repeated; and other pieces again are loosened, and so on until the blood is loaded with these poisoned, perished elements;—obstruction occurs everywhere, and the organism soon perishes. This process is called *Acute miliary Tuberculosis* (galloping Consumption). It has nothing in common with the primary tubercle,—can never originate spontaneously,—may follow the most widely different diseases, but can only occur when a process of mortification, as a previous condition, was going on in some part of the body. It can, however, be artificially produced by inoculation, as shown by Villemin and other experimenters, by inoculating animals with the most widely different kinds of matter. But by the experiments of Waldenburg in Berlin, it has been proved that even these miliary tubercles are capable of being healed, and especially was this the case in such animals as lived upon lime-containing food (goats and horses), while those which lived upon non-lime-containing food, invariably perished (rabbits and guinea-pigs).

Having given a bird's-eye view of a few processes of lung disease, we proceed to classify, anatomically, the various conditions which may occur in the lungs, and shall afterwards give the special pathology of each class.

With this object in view we have to consider the condition of—

1. The Bronchi.
2. The Alveoles.
3. The Blood-vessels and their circulation.
4. The interstitial tissue (elastic tissue).
5. The nerves of the lungs.

A.—Bronchi.

1. Through an accidental or other cause, a congestion (overfilling) of the nourishing vessels of the bronchi may occur, which occasions an abnormal cell formation in the mucous glands; the direct consequence of which is, a swelling of the mucous membrane. These superfluous cells thus formed finally die, and are expelled. They may, however, according to their more or less degeneration, destroy the ciliæ, or hair epithelium of the bronchi;—or cause obstructions of them;—soften their cartilage;—thus enlarge the bron-

chus; infect the cartilaginous cells, destroy them, and thus the whole bronchus (*Bronchitis; Bronchoectasis*, often mistaken for gangrene).

2. From excessive pressure, an enlargement may occur of the nutritive vessels of the bronchi, with stoppage of circulation, and with subsequent fibrinous, polypus-like exudation, with concretions (*croup*, *rheumatic or hæmorrhoidal metastasis*, a frequent cause of *hæmoptysis*).

3. Nervous spasms of bronchi may occur, occasioned by an undue irritation, either of the vagus or sympathetic nerve (*asthma*, *asphyxia*, *etc*).

B.—Alveóles.

1. The Alveoles may never have been extended by air, from birth (*Innate Atclectasis*). This constitutes that condition which has been defined as inherited Consumption. Or they may have collapsed, through neglect or by disease. But both conditions form the basis for subsequent real tuberculosis.

2. The Alveoles may become ruptured, and their wall destroyed.

3. Or they may have been over-extended, so that their power of contraction has been lost (Emphyzema).

C.—Blood-vessels.

a.—Capillaries.

1. The hair capillary-vessels may become over-extended, so as to lose their power of contraction, the result of which would be an excess of blood-water in the lung-tissue (Oedoema).

2. They may become ruptured, and thus permit the escape of blood-cells and fibrin into the tissue, or break through the alveolar walls. This constitutes one of the most frequent and dangerous occurrences in the lungs; the more so, as it is apt to be overlooked, if it comprises only one or two small lobuli. According to the manner in which the blood escapes, and its quantity, we should have hemorrhage, or actual acute pneumonia, the filling up of the lung-tissue and alveoles, which process is subdivided into lobar, lobular, fibrinous, serous, croupous, catarrhic, etc., etc., pneumonia, according to circumstances and complications.

3. Partial enlargement of the capillaries, arising from the absence of external pressure upon them occasioned by the collapse of alveoles constitutes the basis for tubercle formation, and can only occur where respiration in a group of alveoles is totally suppressed (varicosity of capillary vessels).

4. Obstructions of capillaries by foreign bodies, or by dead and morbid cells, the consequence of some morbid process of decay in the body, constitutes what is known as acute miliary tuberculosis, galloping phthisis, often mistaken for typhus.

b.—Arteries, Veins, and Lymphatics.

The larger vessels in the lungs are subject to the same disorders as those in other parts of the body. The walls of these vessels con-

sist of three layers, an internal one, a middle one or muscle layer, and an external one. One of these layers may become congested, and one or several cells degenerated, and this is called inflammation of a vessel. Their walls may finally become dilated on a single spot, or entirely around them (*aneurisms*, *varices*); or their walls may become thickened by deposits into them. The vessels may become ruptured, or be preyed upon by putrid pus, or the cells of their walls may form an outgrowth, thus causing an obstruction, or the vessels may become obstructed by foreign bodies in the blood itself. But since these affections are the same everywhere in the body, and occur less frequently in the lungs than in other parts, we shall give but little attention to this subject here.

D. Interstitial Tissue of Lung.

The cells forming the elastic fibres but very seldom undergo an active degeneration, but suffer, for the most part, through secondary infection; and consequently cancer, fibroid tumors, etc., are exceedingly rare occurrences in the lungs. More frequently we meet with an abscess, the formation of which is sometimes due to a partial new formation from the tissue cells themselves. Abscesses of the lungs are very difficult of diagnosis, and constitute a serious form of Consumption. The meshes of the tissue suffer mostly from rupture, or from over-extension, followed by loss of contractile power and subsequent use.

E. Nerves of Lungs (*Vagus and Sympathetic*).

The very great importance of the nervous system, and its vast influence upon cellular life and nutrition, has never been sufficiently appreciated. Recent discoveries, however, especially those of the celebrated physiologist, Brown Sequard, have shown that this subject bears in a most extraordinary manner upon life generally, and in an uncommon degree upon the lungs. He has found, and demonstrated, by actual experiment, that a comparatively small injury to certain parts of the brain (*Medulla oblongata* and *Pons Varoli*), produce an immediate hemorrhage in the lungs, as well as other disorders. The recent discovery of the so-called abnormal and morbid arrest of nervous power will, undoubtedly, greatly change the views which have formerly been held.

The different pathological changes which occur, may be divided into —

1. Abnormal irritation from the periphery of the body upon the nerves and brain, with its proportionable results of accelerating activity of the heart, blood-vessels, bronchi, alveoles, and tissues.

2. Actual diseases of, or injuries to the brain and nerves themselves; which may be temporary or permanent, and which would produce that condition generally termed paralysis.

3. Changes in the action of the cells of the gray mass, produced either by chemical influence, or by reflex irritation; resulting in spasmodic contraction of blood-vessels, bronchi, and even of the tissues; with rupture or paralysis of them, with total or partially

arrested respiration, a partial or general arrest of normal nutrition, and temporary or permanent arrest of cellular life.

Sometimes the most peculiar injuries, seemingly slight, will be the occasion of the most intense nervous derangement; while at other times, even large tumors in the brain, or pressing upon nerves, will produce but a comparatively slight effect. Such conditions as have been called asthma, asphyxia, spasm of bronchi, spasm of heart, syncope, etc., have their origin in the various derangements of the nerves or brain. The nerves play a more or less important part in any kind of injury to the lungs, or to the body in general.

F. Enlargement of the Vessels of the Pleura (*Pleurisy*).

The blood-vessels of the pleural membranes, under certain conditions, and for certain reasons, may become enlarged or obstructed, the consequence being an exudation of blood-water or blood into the pleural cavity; and the effect, a compression of a part, or of the whole of one or both lungs. In some cases reabsorption of this liquid takes place, while in others it does not. Adhesions of the two pleuras also often occur, which, according to circumstances, may or may not give rise to considerable annoyance. Old cases of pleurisy are often mistaken for lung diseases; they are, however, more frequently complicated with them.

Mistaken for lung diseases, and sometimes complicated with them, are —

1. Diseases of the heart, especially nervous affections.

2. Aneurisms of aorta, or venæ cavæ; degeneration of the lymphatic glands of the chest or neck; the thymus gland; affections of diaphragm; diseases of intercostal muscles, ribs, or vertebræ, spinal column, or brain, etc.; of the larynx, glottis, or uvula.

3. Diseases of the blood, especially of poverty in blood-cells, or an excess of white globules, or of fibrin, albumen, etc. — Blood-poisoning.*

4. Sympathetic symptoms from disorders of stomach, liver, kidneys, uterus, hemorrhoids, etc. (*Drunkards' Cough*, *Hysteric Cough*, *etc.*, *etc.*)

Having thus sketched the lesions which may occur in the lungs, and which constitute, in themselves or their complications, what is termed Consumption, we may further distinguish between a primary cause from *within* the body developing outward, and one from *without* the body developing inward. The whole of the disorders described above, come under the first (from *within* the body); while from the latter (from *without* the body), the bronchial tubes only can be affected. We have learned how well provided the lungs are against dust, by its hair-fibres, which begin in the nose, and end in the finest bronchi. Still, a continued inhalation of sharp-edged dust, as steel, or glass, etc., or of poisonous gases, may interfere with, and produce swelling and chronic inflammation of the mucous membrane of the bronchi, and lead to such serious results as are

* See an article by the writer on this subject, in the Journal of the Gynæcological Society of Boston, for Dec., 1869. Vol 1. No 6. Page 356.

stated above. And it cannot be denied, that the constant inhalation of such nauseous gases as sometimes escape from the decaying lungs of patients, may similarly injure the bronchial tubes of the attendants; and hence the idea of the contagiousness of Consumption has probably arisen. It is also possible that serious affections of the nose, or pharyngeal portion, or even of the œsophagus, might, in a long period of time, gradually infect the mucous membrane of the bronchi. Such an occurrence, however, is not the rule in such cases, but rather an exception, and requires a long neglect, and generally bad condition, to produce such an effect.

We have now delineated every possible injury which can occur to the lungs; and we fail to comprehend how that any one with common sense can hold to the inheritability of any of the disorders named. To affirm that a child may be born with ruptured capillaries, or ruptured alveoles or tissue, or with escaped blood-cells, or inflamed bronchi, is simply absurd. That parents with imperfectly formed constitutions, or rather, with cells of little energy and activity, cannot give birth to a child with so active cells as strong and vigorous parents, is self-evident. When a child is born of weakly parents, it often requires prompt and energetic manipulations to make it breathe at all. Such children are very apt *not* to extend several of the alveoles, and thus the foundation is laid for what is termed inherited Consumption. The discovery of this fact, being of very recent date, has never been used by any author. To maintain the inheritability of Consumption, it is absolutely necessary to believe in the existence of some imaginary noxa, the unknown fiend which has led physicians at all times to views which, from an anatomical standpoint, are exceedingly painful to observe; — views which have given to medical knowledge the popular reputation of being nothing but an imaginary classification of words based upon ignorance. There are children, it is true, which are born with inherited diseases; but all such diseases are positively known, and admit of microscopical demonstration. Such children are at no time healthy, and invariably die before attaining puberty. All inherited diseases arise from the direct introduction of diseased cells from the mother's blood, and is the only way in which an inheritance of disease is possible. In Consumption, such condition has, as yet, never been observed, and it has been positively shown by Virchow, that tubercles never exist in the brain of very young children, as was generally supposed, and that the statement of such appearances is found, in correct observation, to have been a mistake.

We have now learned that that which has been called Consumption is not a real existing something which no one can comprehend or know anything about, but rather an almost endless complication of different injuries which may occur to the lungs, as may have been learned, in part, from the classification given. But to comprehend the whole subject we must understand how that these different injuries complicate one with another, it being possible to find all of them together in one and the same body. It is this accumulation and complication of different processes which has made the subject of Consump-

tion so difficult, so incomprehensible, so pernicious, and, thus far, so absolutely incurable. The intense difficulty of comprehending or understanding all these complications in each case as they arise, may be readily conceived; for, notwithstanding the exactness and reliability of the modes of examination employed, it is not possible, in very complicated cases, to ascertain everything. The greatest difficulty arises, where old and new processes occur together in the same lobes. Under such circumstances the very best specialist would be liable to mistake, to say nothing of the general practitioner. A complete and perfect picture or delineation of such a case, is only possible after a sufficient period of observation by comparison, in connection with logical and anatomical reasoning. The simple processes are comparatively easy of detection and explantion, as well as of treatment, while the complicated ones sometimes offer difficulties almost insurmountable. For example, we find in the same lung, one lobulus filled with old degenerated blood,—pus; and in another part of the same lobe, we meet with a process of escape of fresh blood,—acute pneumonia. The treatment for the first requires expulsion of the pus by expectoration,—a forced treatment; the latter requires absolute rest in bed, for the reabsorption of the fresh blood escaped. What for the one case is good, is the very opposite, or bad, for the other. In addition, do we have to deal with pleurisy at the same time, or with bronchitis as a complication? If so, it can be easily imagined that it becomes a matter of very great difficulty to prescribe the correct treatment in such cases.

Before concluding this outline of the general pathology of lung diseases, we would remark, that although we have given a general view of all possible injuries that can happen to the lungs, under any and all circumstances, it is not possible to give a special pathology that would be exactly correct for all cases; nor even of a single case, that would be absolutely correct for any other single or particular case. It is certain that there has not been two cases of so-called Consumption precisely alike, since the disease was first known. Different cases, it is true, may *appear* to be alike, and so do various games of chess, which, however, differ very widely; each game being played, by the skilful player, as circumstances may require, so as best to meet his antagonist. So each case of lung disease requires to be treated independently, according to its own peculiar complications, indications, and developments. It is one of the greatest mistakes of physicians, as well as of laymen, to fit cases into some one they may have seen before, or in other words, of making the pathology and treatment of one case stand for other cases which *appear* like it. As no naturalist has ever seen two men, animals, or even blades of grass, every way alike, and as no general has ever fought, or even witnessed, two battles, which in every respect were the same, so no physician has ever seen, or can see, two cases of any kind of disease every way alike. Every single case of disorder of the lungs, or of any other part of the body, should therefore be studied in itself, treated accordingly, and recorded as a single case only, and not with a view of making it stand for others.

The physician who has always a certain remedy for Consumption, is playing the part of a charlatan and humbug; while the patient who asks for his remedy, to say the least, is not overstocked with wisdom. From this standpoint we shall endeavor to specify certain processes of disorder, as special subjects, with their treatment, but we object to being understood as giving a pattern that would fit any case. A physician is no more than a general. He has his army drilled and ready for immediate use; — but he could not say what he should do in the next hour, nor what command he should give — but the good general is almost sure to give the right word at the right moment. The bad general, and stupid physician, by determining the entire course of procedure, before they know what, or where, the enemy is, are sure to lose, whenever the enemy takes a course different from their calculations. While we deny the existence of any such disease as Consumption, as such, we positively deny, and object most strongly and absolutely, to any special medicine, or mode of treatment against it. Still we hope to show that any injury of the lung can be better and more satisfactorily managed than has thus far been anticipated by any one. All we require is the exact understanding of the anatomy in question, and the logic of common sense.

PROF. BROWN-SEQUARD IN BOSTON.

WHEREVER war exists, the most tangible proof of the animal and brutal nature in man is made manifest. We cannot but hope, however, that some good may be achieved, or desirable end gained, which shall prevent these sanguinary conflicts from becoming altogether an unmixed evil. In the moment we write the two first nations of the globe stand against each other, preparing for more slaughter — or for peace, as we sincerely hope. To the one the world owes the freedom of thought; to the other the freedom of men. The villanous ambition of but a comparatively few men, who understand how to use the ignorance of the people for their own selfish aggrandizement, has caused millions of human beings, who have been brought up with years of care and toil, to slaughter each other like wild beasts of prey. Hence, two nations that have been first and foremost in bringing the world to that high civilization which rests only upon science and art — nations which should be brothers — stand incensed by animal passion to hatred and deadly strife. This unhappy and lamentable state of things in connection with these nations, has been the occasion of bringing back to these shores the celebrated physiologist, Prof. Brown-Sequard, whose house, in Paris, with his valuable instruments and library, is perhaps in ruins. In aid of the suffering French, he recently delivered a popular lecture in Tremont Temple, upon "*The nervous influence upon normal and abnormal nutrition*," in which he stated some of his most recent and valuable discoveries. From one point of view it would not be difficult to lecture upon this subject, inasmuch as very few know anything about it; but it is immensely difficult to demonstrate in a single hour the whole subject, in its importance, in such a manner as to be within the comprehension of everybody. To do this a knowledge of the simple facts is not sufficient, but requires an absolute command of the whole field of science. Carl Vogt has remarked that he would sacrifice ten German professors of æsthetics for one Venus of Milo in Paris; and, being in full sympathy with this sentiment, we would most cheerfully sacrifice a whole set of medical professors, that teach what they do not understand themselves, for one

popular lecture of Brown-Sequard. The subject of the lecture was divided into "*The influence of disturbances in the periphery of the body upon the brain*, *of disturbances in the brain upon the periphery*, and *the morbid arrest of normal cerebral action.*" The most conclusive proof was given that a seemingly trifling and insignificant injury might be the occasion of the most serious cerebral symptoms, and, on the other hand, that only a very small injury to the brain is required to produce the most disastrous consequences in the body. In demonstrating the morbid action, or arrest of nerve-power, in its different relations, certain characteristic symptoms, which occur under given circumstances, were distinctly pointed out; and each particular point presented, illustrated with cases, and in a way to show very plainly what the lecturer wished to communicate. M. Brown-Sequard also stated that he had found the animals in America much less nervously irritable than those of Europe, and hence that they were not so easily inclined to hemorrhage; but that in man he had found the very opposite. We think, however, that the latter refers more particularly to large cities than to Americans in general. It is true that in the cities Americans are nervously weak and excitable, but not, as a general thing, elsewhere. The coolness of the Indian, of the Maine boys — the steady hand and unfailing shot of the Western hunter — and even the coolness of the American business man, are too world-renowned to be lost sight of. In fact, we have an illustration of the truth of this remark in an affecting incident connected with the Professor himself; for, when Agassiz referred, in very strong terms, to the miserable condition of France, he (Brown-Sequard) became so much affected that he could hardly speak, while, at the same time, tears ran down his cheeks. We have never known of an American being similarly affected.

The effect of the nervous system upon the blood circulation was also referred to in a very highly interesting manner. After having briefly noticed all the most important points, he closed his lecture with these words: "And I hope sincerely that the time will come when physicians will make use of science, and of nothing but science — *although I probably shall not live to see it.*" "It will then not be so much their point to cure a patient as it will be the object of medicine to prevent disease altogether." This remark would indicate that M. Brown-Sequard does not overestimate the profession of Boston, by whom such flattering truth is not appreciated; nevertheless, we applauded the sentiment most heartily. We trust, however, that, as soon as he shall have perused *Good Health*, he will observe that the light of science is gradually breaking through the Rip-Van-Winkle views of the past. Although, in all probability, but comparatively few completely comprehended or understood the lecture, yet the audience was doubtless convinced that there is more to be learned in medical science than most people here are aware of, who support in Boston alone more cure-me-quicks than the whole earth can boast, of men like Brown-Sequard! We only regret that we cannot make everybody fully comprehend this lecture.

Before closing this brief sketch, we cannot but allude to a most remarkable phenomenon in connection with the Boston journals. Not long since, a certain celebrated quack doctor gave a great party, and the journals of Boston devoted a whole column to the description of it, and with such accuracy as to describe the edibles and articles of attire, even to the thoughts and doings of the flunkeys, as if the world in future depended upon it. But when Prof. Brown-Sequard reads a lecture upon one of the most important of questions — that of the brain and nerves — before an audience of two thousand of the most intelligent persons of Boston, these same journals do not think it worth while to trouble themselves to give anything like a comprehensive synopsis of the subject. If such is the result of modern civilization and journalism, the next generation is sincerely to be pitied. A friend of ours designates such a state of things as "*Can-can civilization.*"

CARL BOTH.

THE ALCHEMISTS.

THE dark ages are generally spoken of very contemptuously — a judgment scarcely warranted when we consider the actual fruits of that period. During the darkest part of it — that is, from the fall of the Western empire to the beginning of the thirteenth century — the numerals called Arabic were introduced; paper was made from linen; the arts of war and navigation were entirely altered by the discovery of gunpowder and of the compass; and the introduction of oil-painting, printing, and engraving, closed the series of improvements. In the twelfth and thirteenth centuries we find the cultivation of the Roman law, the rise of the scholastic philosophy, and the commencement of poetry in modern languages, in Sicily, in Tuscany, in Provence, in Catalonia, in Normandy, in England, in Scotland, and in Suabia.

Throughout the middle ages science was regarded as merely a form of magic, and its cultivators as magicians—a character they seem in many cases to have willingly accepted.

Many marvels were doubtless produced by the use of the "phantasmagoria," lenses, or concave mirrors. An example is found as early as the ninth century, when Theodore Santabaren, who had been long celebrated for possessing the gift of miracles, gratified the Emperor Basil with a glimpse of his deceased son. The phantom, magnificently dressed, dismounted from a splendid charger, advanced to the emperor, threw itself into his arms, and vanished.

A still more striking example of the use of optical images in the art of necromancy is related by Benvenuto Cellini, who flourished in the middle of the sixteenth century. A Sicilian, skilled in literature and the black art, assisted by another necromancer, a native of Pistoia, showed Cellini, two of his friends, and a boy, twelve years old, an extraordinary scene in the Colosseum at Rome. They took with them fire, assafœtida, perfumes, and compositions of a nauseous odor. The performer, with various ceremonies, drew circles upon the ground; the strangers were then handed into the circle; the perfumes were flung into the fire; Cellini received a pintaculo, or magic chart, which he held over the boy; and at the invocation of the necromancer, the amphitheatre was filled with demons, most of whom remained till the bells rang for morning prayer. A writer in the *Quarterly Review*, on "The Philosophy of Apparitions," gives the following explanation of this curious exhibition: He considers that the apparatus consisted of one or more concave mirrors or of lenses. "Highly illuminated pictures or figures of demons, placed out of sight, were the objects from which the mirrors or lenses threw distinct images upon the volumes of smoke which rose from the fire. A slight change in the position of the objects, or in that of the mirror, would cause the aërial pictures to change their places, to flit from one wreath of smoke to another, and to give the idea of a legion, or a constant succession of demons. The same effect might have been produced by a large multiplying glass; but, however this may have been executed, it was obviously under the management of the conjurer of Pistoia, while the master necromancer had taken his place within the magic ring in order to observe the progress of the experiment, and give directions by signals for any new appearances which he might think proper to invoke." The fumes of the nauseous compositions were probably intended to intoxicate or stupefy the spectators.

Much of what has been represented as magical on the part of the mediæval men of science was simply an exaggeration of their experimentalizing; as, for instance, Roger Bacon's acoustic experiment with a brazen head,

which the chroniclers have represented as a magical contrivance.

The Jewish philosophers, called *cabbalists*, who professed the study of the cabbala, or traditional mystic interpretation of the sacred books, believed that certain mysterious significations of words in Scripture could be obtained by combining the letters of which they were composed; and from this mystic knowledge magical characters, or figures, were derived. Much of the doctrine of the Jewish philosophers was embraced by the sect called the Cabalists, which existed all through the middle ages, and as late as the seventeenth century. The Cabalists believed in the existence of spirits of nature, embodiments or representatives of the four material elements, which they termed sylphs, salamanders, gnomes, and ondines, beings mortal, yet untainted by human weaknesses, and of far more than human excellence. The cabalist aimed at qualifying himself, by fasting and celibacy, and by constant study of nature, to rise above humanity to intercourse with these elemental spirits. These simple notions were overlaid by mediæval materialism; but they exercised a powerful influence over all the scientific men of those ages. Paracelus and Cornelius Agrippa were attracted by them, and they modified the doctrine of the alchemists, who assimilated the forces that governed nature to spirits, and endeavored to acquire a mastery over them.

The alchemists, whose doctrines appear to us extravagant dreams, had, after all, some excuse for their main article of belief — the transmutation of the baser metals into gold. All the metals may be extracted from transparent crystals, which in their appearance scarcely differ from a piece of common salt or sugar-candy. A diamond can be reduced to mere charcoal; a virulent poison may differ from wholesome food only in the difference of quantity of the component parts, the substances being the same; and similarly the very same ingredients will constitute a gas, a fluid, or a solid, according to the proportions of the elements. When so many magical transformations by the action of chemicals were daily observed by the experimentalist, it is not surprising that, when Nature's laws were yet unknown, he should hope to discover the one great secret of all these transmutations, in the philosopher's stone, or some such grand talisman.

The first traces of alchemy are to be found in the writings of certain Greek ecclesiastics of the fourth century; but their speculations seem to have been speedily forgotten. The Arabians, who succeeded to the culture of the Greeks, applied themselves diligently to the study of alchemy, which, towards the decline of the Eastern empire, had begun to be cultivated at Alexandria and Constantinople. They discovered the art of distillation, besides other useful processes; and invented various chemical vessels and apparatus. When, under the appellation of Moors or Saracens, the Arabians conquered Spain, their learning was carried along with them into Europe. In the twelfth century alchemy began to attract general attention in Europe, and to exercise its fascination over the strongest and most active minds. The main object of the alchemists was to obtain gold. They endeavored to effect this in three ways. The first was by separation from other metals, every metal being believed to have some gold as an ingredient! the second was by purifying and subtilizing mercury, or quicksilver, which they regarded as the basis and matter of all metals; the last was by transmutation — any metal was subjected to heat, and a small quantity of a certain preparation was cast into the fused matter, when the fæces would be volatilized or destroyed, and the rest of the mass would be changed into pure gold. This transmuting element was the philosopher's stone, the discovery of which became the great object of the alchemists.

Another doctrine of the alchemists was the use of the philosopher's stone as a panacea, or universal medicine, which was no doubt suggested by the great success of the Arabian physicians in arresting violent and otherwise in-

curable diseases by mercurial applications. The gift of rejuvenescence was believed to be another quality of the philosopher's stone; and one of these alchemical doctors, Solomon Trismosin, after having renewed his own youth by a single grain of it, restored perfect youthfulness to ladies ninety years of age, thus utterly surpassing the modern "Beautiful for ever."

Another doctrine of the alchemists was that of "Palingenesis," the reproduction of a rose or any other plant from its ashes; and it was supposed that the dead could similarly be reproduced. Such experiments were believed to have met with success even in the time of Louis the Fourteenth, in the middle of the seventeenth century. Three Parisian alchemists took some earth from the burial-ground of the church of the Innocents, and exposed it to distillation in a glass phial. Suddenly human forms appeared within the transparent poison, and the terror-stricken experimentalists fled from the laboratory. Soon after this story was noised abroad, to test its truth an experiment was made on the body of a malefactor, of which Dr. Ferriar has given the following account in the "Miscellanea Curiosa":—

"A malefactor was executed, of whose body a grave physician got possession for the purpose of dissection. After disposing of the other parts of the body, he ordered his assistant to pulverize part of the cranium, which was a remedy at that time admitted in dispensatories. The powder was left in a paper on the table of the museum, where the assistant slept. About midnight he was awakened by a noise in the room, which obliged him to rise immediately. The noise continued about the table without any visible agent; and at length he traced it to the powder, in the midst of which he now beheld, to his unspeakable dismay, a small head, with open eyes staring at him. Presently two branches approached, which formed into arms and hands; then the ribs became visible, which were soon clothed with muscles and integuments. Next the lower extremities sprouted out; and, when they appeared perfect, the puppet (for his size was small) raised himself on his feet. Instantly his clothes came upon him, and he appeared in the very cloak he wore at his execution. The affrighted spectator, who stood hitherto mumbling his prayers with great application, now thought of nothing but making his escape from the revived ruffian; but this was impossible, for the apparition placed himself in his way, and, after divers fierce looks and threatening gestures, opened the door and went out."

This doctrine of the "palingenesis" received countenance from a large number of the educated in England. It was merely the reproduction of the old physical theory to explain the supposed reappearance of the dead. The poet Lucretius, the Roman exponent of the Epicurean philosophy, held that just as the reptiles cast their skins and leave behind them their real external covering or exuviæ, all material objects were constantly throwing off exquisitely subtle superficial films, "simulacra," or images, which floated about in the air, being for the most part unseen; that their impact on the eye produced vision, and on the ear, hearing; and that the ghosts of the departed were merely these outward and still surviving films of the human body. This view was only slightly altered by the alchemists, who supposed that after the gross bodies of animals and plants are destroyed, the idea, figure, or actual shape still exists, and may be reproduced; and in the case of human beings, the "corporeal souls do exist apart, and attend upon, or are near, the blood and bodies." Another extension of the ancient hypothesis was made toward the end of the last century in the doctrine of the Swiss philosopher, John Caspar Lavater, that individuals could influence the imaginations of others at a distance, and enable the latter to create a vivid phantasm of the former.

Some instances of successful alchemists are reported. Raymond Lully, the Catalan, is said to have made a great quantity of gold for Edward the First of England. In one operation alone

he transmuted fifty thousand pounds weight of quicksilver, lead, and tin, into pure gold; and his total contribution to His Majesty's mint was six millions sterling! But as Lully had supplied the gold on condition that it should be employed in making war upon infidels and unbelievers, whereas the king used it for his war against Scotland, Lully refused further supplies, whereupon he was incarcerated in the tower, from which he at length, in 1313, made his escape, disguised as a leper. Another alchemist, Richterhausen, having satisfied Frederick the Third of Germany of his success in transmuting, was created by him a Baron of the Holy Roman Empire under the singularly appropriate title of "Baron of Chaos." There is a story told of two would-be transmuters, which its fatal termination alone keeps from being ludicrous. A barber in Alsace, John Henry Muller, having given out that he had found the philosopher's stone, was created by the Emperor Rodolph — a munificent patron of the occult sciences — Baron of Müchlenfells ("The Rock of the Mill"). After various adventures, he proceeded to Stuttgart, the royal residence of Duke Frederick of Würtemberg. The baron was able to impose on the duke, who was an ardent alchemist, in transmuting by the assistance of a confederate who was concealed in a chest supposed to contain chemical apparatus. But the impostor was soon placed in an awkward situation by the arrival of a Polish nobleman, Sandivogius, reputed the first alchemist and magician of the age, whom he believed to be actually in possession of the philosopher's stone. To avoid the exposure which he feared was impending, he induced Sandivogius, who probably was actuated by similar fears of the result of a collision, to run away, by informing him that the duke was about to put him to the torture to obtain his secret from him. By virtue of a forged order, Müchlenfells arrested Sandivogius in his flight, threw him into prison, and took possession of his property. The Pole, who was nearly killed by the severities the baron had inflicted on him to extort a confession of the mysteries of the art, at last escaped, and arraigned the baron before the imperial tribunal. The impostor was condemned to death, and though he begged hard to be beheaded, he was hanged, dressed, as an emblem of his crime, in a garment covered with gold-leaf.

From their continued and varied experiments, the alchemists naturally acquired much chemical knowledge, which began to be turned to a deadly use about the sixteenth century. The crime of poisoning, which first appeared in Italy, gradually spread over Europe. But though alchemy had its evil side, when it fell into the hands of infamous men, it had also good effects. To it we owe the rise of experimental philosophy. Though their main object was purely visionary, yet the alchemists had the sagacity to perceive that the only sure method of investigation lies in the appeal to facts. Leaving mere observation, to which alone the ancients had trusted, they anticipated Bacon in his *interrogation* of Nature, and labored to extort her secrets by that artificial exclusion of accidents which afterwards obtained the name of *experiment*.

How to Administer Raw Meat.—The *Lancet* says: "The fillet should be preferred, as being the most delicate and the richest in muscular fibrin. It should be freed with the utmost care from fat and tendon. It should be finely minced, and then brayed in a mortar of wood or stone. When reduced to a paste it should be covered with sugar, gluten, or vegetable gelatine, to overcome the repugnance with which it is at first naturally regarded. Some prefer to squeeze out the juice, and swallow it mixed with a little orange-flower water, etc.; whilst others again make it into boluses, and take it in slightly warmed beef-tea or soup."

The Prophet asks, What is man? From a very materialistic point of view, an exchange paper says, that, taking the average, at fifty years of age a man has slept 6,000 days, worked 6,500 days, walked 800 days, amused himself 4,000 days, was eating 1,500

days, and was sick 500 days. In this time he has eaten 79,000 pounds of bread, 16,000 pounds of meat, 4,000 pounds of vegetables, eggs, and fish; and drunk 7,000 gallons of liquid—namely, water, coffee, tea, beer, wine, etc. — altogether. This would make a respectable lake of 300 feet surface and three feet deep, on which a small steamboat could float comfortably. Few men of fifty, probably, have looked upon themselves in this light before.

Opposition to Vaccination in India. — The natives of the Northwestern Provinces of India object to vaccination for the following reason:

They believe that a native child is to be born whose destiny it will be to drive the English out of India, and then to conquer the world. This child is to be distinguished from other children by having milk, instead of blood, in its veins. The natives believe that, by vaccination, the English are seeking to discover the wonderful infant, so as to imprison or kill him.

Earth Eating. — It is well known that, in different parts of the world, there are people who eat earth; among them are some of the natives of Java, who eat a red kind of earth as a luxury. This earth, which is soft and smooth to the touch, has been analyzed by a German chemist, who finds it very rich in iron, with a small quantity of potassa and soda. Some tribes eat earth to stay the pangs of hunger by filling their stomachs, and because at times they can get nothing better; but the people in Java eat their earth, baked in thin cakes, as an agreeable variety in their general diet. The cakes, when slightly moistened, are rich and unctuous, and the enjoyment in eating is supposed to consist in the sensation produced by a fatty substance. It is a curious fact in the history of human habits.

Typhoid Fever. — It has been proved that typhoid fever may be entirely prevented by taking care that drinking-water is absolutely free from the foul matters of common sewers. That typhoid fever is directly traceable to foul water has been proved over and over again. One case is horribly instructive. The excreta from a fever patient leaked into a well: a milkman mixed this well-water with his milk, and in every house at which he sold the milk one or more persons fell ill with typhoid fever. We are tempted to ask: Can such things be in a nation calling itself civilized? especially as various means exist by which the contamination of water can be prevented. The subject is one to which public attention should be unceasingly directed.

Why Birds are found dead under Telegraph Wires. — Professor Listing, of Göttingen, in an article on certain optical phenomena, explains why birds are so often found dead under telegraph wires. It is not, as is popularly believed, that they were killed by a passing current while perched on the wires, but because their eyes being in the same horizontal plane, they cannot calculate their distance from the wires, and are consequently killed by flying against them. It is to this same fact — the horizontal plane — that the difficulty of distinguishing the edges of the steps occurs while going down stairs, and of clearly calculating the distance from one to another.

The Famous Carlisle Life-tables are well known to all concerned in life assurance. They were formed on the vital statistics collected and arranged by the late Dr. Heysham, a celebrated physician of Carlisle, who died a little while ago, at a very advanced age. His life has recently been written by Dr. Lonsdale, and published in a very costly volume. He is described thus by a contemporary: "How noteworthy a figure he was — how lusty, vigorous, and well-chiseled his character and life! There stands the man —'a three-bottle man,' a hearty liver, a vigorous politician, a laborious statist, an enlightened practitioner, an unaffected philanthrophist, an eccentric magistrate, the friend of Paley, Milner, and Law, a man to be liked and relished."

COURIER PIGEONS.

THE man who, this time last year, might have hinted that the people of Paris would ere this be escaping in balloons from the city, which German hosts were so inexorably investing, or that messages would be sent by pigeon-post, would have been reckoned a fit person to have been at once taken care of by his friends. Yet, day by day, these aërial messengers, the courier or carrier pigeons, with their burden of minutely photographed missives — bearing, fastened to their feet or the middle feather of their tails, despatches on which the fate of the city of the world hung — have winged their momentous journeys to and from unhappy Paris.

Their Prussian foes have met this manœuvre as well as they could, by training hawks to run down the pigeons, and thus intercept the communications; but their success has only been partial, and it may safely be considered that the majority of the "couriers" reached their destination safely.

The carrier or courier pigeon, whichever we may select to call it, has been known and celebrated from the most remote antiquity; and its use as a messenger is repeatedly celebrated by the poets of Arabia, Greece, and Rome. The old historians, also, make frequent mention of it, as, in some instances, carrying intelligence with wonderful rapidity; and in others — as in the case of the birds employed by the beleagured Parisians — performing the same office where hostile armies, or other impediments, prevented communication along the ground.

Elian mentions that, when Taurostheus was victor at the Olympic games, a carrier pigeon bore the tidings to his father with wonderful celerity. Pliny records an instance of the use of these birds to beleaguered cities. When Modena was invested, he says: "Of what avail were sentinels, circumvallations, or nets obstructing the river, when intelligence could be conveyed by aërial messengers?"

We find them also largely employed in the Crusades for the same purpose; and instances are mentioned in which the pigeon was captured by the besiegers, and made the bearer of a very different message from that with which it was originally charged. Hawks, as we mentioned in the case of the Prussians at the present time, were occasionally kept by the foe outside the walls, for the express purpose of being flown at the pigeons; and as it is against the habit of the hawk to strike the ground, the pigeon dropped like a stone uninjured, and allowed itself to be captured. The hawk was then recalled to its lure, the pigeon was freighted with false intelligence, and despatched on to its original destination.

Carrier pigeons have been used, also, as much for the purposes of commerce as for those of war. By this means, those merchants who employed pigeons could obtain information which, upon the arrival of ships, they had abundant time to turn to good advantage. The case is mentioned where a merchant killed one of these pigeons by accident, and learned from the message attached to it that there was a great scarcity of galls in England. With true commercial acuteness, he took advantage of the fortuitous note; and, by buying up nearly the whole quantity of the required article that was in the market, cleared what was considered in those days an ample fortune.

In the East, however, in former times, the employment of carrier pigeons was reduced almost to a system; and intelligence was conveyed by them from point to point, much in the same manner as is now done by telegraph. Slight towers were built along the line, at thirty or forty miles' distance apart, and the pigeons were employed in flying from tower to tower. Each bird wore a very small box of gold, of extreme thinness, suspended from the neck. As the pigeon wore this box always, it could carry the message, and bring back the intelligence. Sentinels kept constant watch on the towers; and

as each bird flew from its own tower to the next, and back again, a regular system of intercommunication was kept up.

The peculiar gift of the carrier pigeons has been put, however, to strange uses at times. In England, not so many generations ago, when Tyburn Gate — close to where the Marble Arch now stands — was the place of execution for London, it not unfrequently happened that, although the sentence of death was passed in the usual form, it was not really intended to inflict more than the disgrace of being drawn on the hurdle from the prison at Newgate to the place of execution at Tyburn. Hence, pardons and respites were very often given at the foot of the gibbet. The friends and relations of criminals, in those days of "gentlemen" highwaymen, were often people in comparatively elevated positions, and naturally felt great anxiety for the fate of the condemned. The plan adopted by them was to have some one there with a carrier pigeon; and the instant the result was known, the bird was thrown up, and, bearing its message of joy or despair, winged its way to its destination at the rate of twenty or thirty miles an hour.

The courier pigeons used by the French are what are commonly known as Antwerps.

The qualities possessed by the Antwerps are undoubtedly beyond those of any other species. In the first place, they are the most intelligent and serviceable of *voyageurs*. In rapidity and power of flying they far exceed any other variety. As an instance of their strength of wing, a flight of them has been often observed to dart off in a gale of wind, and, after being apparently swept away by the blast, return in the very teeth of the gale, with almost the same ease and rapidity as they would have done in calm weather.

The distance, also, they are capable of travelling in a comparatively short space of time is remarkable. When two years old, they are capable of returning a distance of over five hundred miles in twelve hours, providing the sky be clear and the wind favorable; for it must be remembered that the pigeon will scarcely ever fly in the night, or when the weather is foggy.

An idea generally prevails that you have only to send a pigeon away from home, and that it is certain to return — a certain unerring instinct being commonly supposed to guide the bird. This is a fallacy. It has now been pretty well proved that acute sight alone is the ruling agency. This has been shown in many ways. Pigeons, as we have said, scarcely ever fly by night or in foggy weather; and, as another instance, if the ground is covered with snow they seem to miss their points of guidance, and are lost. If, again, in the course of their flight, the shadows of evening come on before they reach home, they invariably settle down, and renew their journey at daylight next morning.

Parisian Diet during the Siege. — Some members of the Paris Jockey Club determined to have a *dîner de siége*, comprising all the recently adopted elements of food. The famous epicure Baron Brisse was intrusted with the preparation of the *menu*, which consisted of the following items: — *Hors d'œuvre*, radishes, herring *marine*, onions *à la Provencale*, slightly salt butter, gherkins, and olives. First course.— Soup of slightly salted horse, with vegetables; ass flesh cutlets, with carrots; mules' liver, *sauté aux champignons;* horses' lights, with white sauce; carp *à la matelotte;* fried gudgeons; celery heads, with seasoning. Second course. — Quarter of dog, braised; leg of dog, roasted; rats cooked upon the ashes; rat pie, with mushrooms; *Eel à la broche;* salad of celery and small salad. Dessert. — Dutch cheese, apples, pears, marmalade *au Kirsch*, *gateau d'Italie au fromage de Chester*. The banquet, which was served in one of the principal establishments of the Chaussé d'Antin, is stated to have been a complete success.

Jet black eyes are the attraction; jet black hair, ditto; but jet black finger-nails should be strenuously avoided.

Dr. Emmons, the able New England divine, met a pantheistical physician at the house of a sick parishioner. It was no place for a dispute. It was no place for any unbecoming familiarity with the minister. It was no place to inquire into the age of the minister, especially with any intent of entangling him in a debate; and above all, where the querist was too illogical for any logical discussion. But the abrupt question of the pantheist was: "Mr. Emmons, how old are you?" "Sixty, sir; and how old are you?" "As old as creation," was the triumphant response. "Then you are of the same age with Adam and Eve?" "Certainly; I was in the garden when they were." "I have always heard that there was a third party in the garden with them, but I never knew before that it was you."

"You have lost your baby, I hear," said one gentleman to another. "Yes, poor little thing! It was only five months old. We did all we could for it. We had four doctors; blistered its head and feet; put mustard poultices all over it; gave it nine calomel powders; leeched its temples; had it bled; and gave it all kinds of medicines, and yet, after a week's illness, it died."

An apothecary's boy was lately sent to leave at a house a box of pills, and at another six live fowls. Confused on the way, he left the pills where the fowls should have gone, and left the fowls at the pill place. The folks who received the fowls were astonished at reading the accompaning directions: "Swallow one every two hours!"

Some one describing a ball, said it was a vast assemblage of people who had never met before, and who never cared to meet again, and that they talked a little, danced a little, ate a little, and then went home cross and tired, and scandalized not a little.

A rough individual, whose knowledge of classical language was not quite complete, had been sick, and on recovering was told by his doctor that he might take a little animal food. "No, sir," said he, "I took your gruel easy enough, but hang me if I can go your hay and oats."

During the late war, Dr.—— entering the hospital surgery, met Paddy Doyle, the orderly, and asked him which he considered the most dangerous of the many cases then in hospital. "That, sir," said Paddy, as, with an indicative jerk of the thumb, he pointed to where, on the table, lay a case of surgical instruments.

A gentleman, in describing the absurdity of a man dancing the polka, appropriately said "that it appeared as if the individual had a hole in his pocket, and was vainly endeavoring to shake a shilling down the leg of his trousers."

A person being asked which luminary he preferred, the sun or the moon, replied—"the moon, because it affords light at night, when it is needed, whereas the sun only gives light at day, when we don't want it."

Some of the citizens of Hamburg, Germany, became seriously offended by the lecture of Carl Vogt, in which he demonstrated the descent of the human family from the monkey. Why, said one, does he not say that we *are* monkeys, on which nature has neglected to provide for the tail!

General Von Moltke is said to have remarked that the American war was only a contest between two armed mobs, from which no scientific advantages could be gained. We are puzzled to know which is the more advantageous; to be crippled or massacred on a scientific, or on an unscientific principle?

"Let us avoid that handsome woman coming up the street," said a physician to a friend; "she always looks so cross at me that I do not like to meet her." "Is there any reason for it, doctor?" "Yes; I attended her husband once when he was low with a fever." "Ah, I see. It was one of your bad cases; you lost him." "On the contrary, I saved him, and that is what she has never forgiven me for — she would have made such a magnificent widow — and she knows it."

"Nothing will stay on my stomach," said an old toper, "but beef-steaks and Hodgson's ale; what do you think of my stomach, eh, doctor?" "Why, I think your stomach is a very sensible stomach," was the unequivocal reply.

A singing master, while teaching his pupils, was visited by a brother of the tuneful art. The visitor observing that the chorister pitched the tune vocally, said, "Sir, don't you use a pipe?" "No," replied Semibreve, with admirable gravity, "I chew."

"Wife, do you know that I have got the pneumonia?" "New monia, indeed! Such extravagance! You're the spendthriftest man I ever did see, to go and lay out your money for such trash when I do need a new bonnet so much!"

Intuitive Affection. — "There are three things," said a wit, "which I have always loved without ever understanding them: painting, music, and women."

"Now then, my hearties," said a gallant captain, "you have a tough battle before you. Fight like heroes till your powder's gone, then — run. I'm a little lame, and I'll start now."

Why is divinity easier than the profession of physic? Because it is easier to preach than to practise.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

CAUSES OF INSANITY.

BY T. W. FISHER, M.D., BOSTON.

WITHOUT attempting to be profound or statistical, it may be instructive to consider what are the causes on which what is known as insanity depends. This question of causation is not without its difficulties, but there are certain primary facts of importance which are to be relied on. Before proceeding to consider them, it will be necessary to premise something of the nature of insanity.

To begin with, then, insanity, of whatever variety, is only a symptom of disease of the brain. In its study, we have nothing to do with *mind* apart from its organ, the brain. Our knowledge begins and ends in *cerebral* phenomena. In various ways we may reach a belief in something which in part controls them, but we can know absolutely nothing of it, and have no right to attribute states of disease to a mere abstraction. Speculate as we may, "to this complexion must we come at last."

This disease may be functional or organic, in the ordinary sense of those terms; that is, mental disturbance may arise from changes in the circulation, nutrition, or nervous action of the brain, which may seriously affect its functions without leaving any visible change of structure; or, as is more usual in long-continued disease, certain effusions, hardenings, softenings, and other changes of a microscopic nature, may exist. These structural changes are, however, more likely to be the results than the causes of insanity. It is more than probable that, in another sense, all insanity is organic. The adult brain differs from that of the infant, in that it contains the *organized* results of all past actions, sensations, thoughts, and feelings; at any rate, as far as these are capable of resuscitation in memory. The mental phenomena of insanity are in the same way registered in the organic constitution of the nerve-cells. Channels for disordered emotions, and tracks for erratic thought, are established there beyond a doubt; but these subtle changes are, of course, beyond demonstration.

Not all cerebral diseases produce insanity. The brain, being the seat of sensation, and the centre of the power of motion, these functions are often affected independently, since they have more or less definite locations in the cerebral mass. It is not till the rind of superficial gray matter is touched, that mental disorder occurs. Here, on the surface of the cerebral hemispheres, lie those beautifully con-

voluted strata of cells, which preside over the highest functions of human life; arranged in patterns of inconceivable intricacy, yet plastic to every nervous influence, they present an organization susceptible to the most various harmful influences from within and without.

Not all mental disturbance, however, is insanity, since, according to custom, transient forms of delirium are considered apart, though phenomena of the same order. No definition of insanity can be in the nature of things exhaustive, though here is one coming very near the mark. According to Dr. Ray, insanity is a disease of the brain, inducing a prolonged departure from those modes of thought and states of feeling natural to the individual in health.

We will carry our analysis one step farther only, since to consider here the various phases of insanity would needlessly confuse and protract this paper. The mind, so called, may for practical purposes be considered on three sides, making three grand divisions of its powers, viz.: the intellect, the emotions, and the will. These are somewhat arbitrary distinctions, and it is not certain that these functions have each a separate and local habitation. But we may infer an organic difference of some kind, from the fact that they may be affected disproportionately by disease. It is seldom that either is solely disordered, although emotional insanity of the most outrageous kind may exist, without marked disturbance of the reasoning powers. So the will may be paralyzed, leaving an individual at the mercy of chance impulses, unable to restrain himself as reason directs; more commonly these functions are affected in succession, or in different degrees, during the same attack.

Having disposed of these preliminary points, we may go on to consider the causes, near and remote, of insanity. First among the latter stands Heredity. This term demands explanation, and at best is obscurely understood. It must not be taken in too narrow a sense, for insanity may be called hereditary, if a tendency to it is shown in collateral branches of the family tree. Instances of the disease in uncles, aunts, cousins, brothers, or sisters, may point to a family tendency as well as if parents and grandparents were affected. Many nervous diseases, such as epilepsy, hysteria, alcoholism, neuralgia, and the like, should be taken account of in the search for hereditary causes. The question does not exclusively concern the existence of insanity in one's immediate ancestors, but relates to the prevailing family weakness. Most individuals know where the family shoe pinches in this respect. One may be conscious of a tendency to "weak lungs," or "torpid liver," or rheumatism, or scrofula, while another, ignoring these imperfections, feels all those mental perturbations which belong to the insane temperament.

In this large sense, insanity is notably hereditary. Indeed, it has been thought by some to be always a disease of the family, requiring at least two generations for its full development. In this view, to use a homely figure, it may be likened to that style of trowsers, once said to be in vogue, which took two men to show the pattern. This much we know, that any and all causes which tend to produce a degenerate type of nerve-cell in the offspring, are fruitful causes of insanity.

Another cause of insanity, not often mentioned, is found in a too early ossification of some or all the sutures of the skull, preventing that full and symmetrical development of the brain, important for perfect action. This has been pointed out, by European authorities, as a constant cause, in certain forms, of cretinism and partial idiocy; and the fact of important deviations from a normal standard in the crania of the insane, has also been observed. I have recently been able, by critical outline-measurements and comparisons of one hundred and eighty-five heads, to confirm these observations, and to show that the average cranium in the insane, is smaller and narrower than in the sane.

Given, then, an enfeebled cerebral organization, what causes predispose to insanity in the individual? Evidently any and all which tend still further to deterioration of the nerve-cells. And here it may be well for the peace of mind of sundry "nervous" people, to discriminate between constitutional nervous debility, and the insane temperament. Through lack of original vitality, many persons go through life with a nervous system constantly on the verge of bankruptcy. Their daily accumulations of strength serve barely to meet the daily organic demands of the body, and no surplus remains for the struggle with the active duties of life. Any unusual demand upon their energies, leaves them stranded, with now this, and now that form of nervous disorder, but with no necessary tendency to insanity. The mind, barring its lack of energy, may be free from any disturbance. On the other hand, when there is some hereditary defect in the organization of the superficial gray matter, slight causes will disturb its functions, although the lower cerebral operations may be carried on properly enough.

The most frequent predisposing causes are, exhaustion from overwork, the various moral sources, such as grief, anxiety, disappointment, fear, *ennui*, the abuse of stimulants, and excesses of all kinds. These causes may so act as to induce insanity in a healthy individual, but they are undoubtedly most efficient in the presence of an insane temperament. These statements are trite enough, but are important as lying at the foundation of all treatment — preventive or remedial. They have the most practical bearing on the education of children, the choice of occupation, and the conduct of life. Many a valuable mind has gone prematurely to decay, through misapprehension or neglect of these facts. But this evil is as nothing to the injustice which has for ages existed, the direct result of ignorance of the incipient or obscure forms of mental disorder. No class of facts is so calculated to enforce the divine lesson of *charity* for the weaknesses and sins of our fellow-men.

We must bring this brief and inadequate paper to a close, by enumerating some of the proximate causes of an attack of insanity. These often pertain to the age of the individual, and a name is given in accordance with the time at which the attack occurs. There is an insanity of pubescence, and a climacteric, and senile insanity in both sexes, and in the female, puerperal, and other forms, connected with some special condition. Epilepsy, hysteria, neuralgia,

and other neuroses, may suddenly induce insanity by a transference of their special irritations to the higher centres of thought and feeling. The poisons of gout, rheumatism, uremia, alcohol, and the like, may prove exciting causes. Enforced loss of sleep is a very efficient cause, as it is also an early symptom. Enforced abstinence from food is, fortunately, seldom an exciting cause in this country, though a deficient supply may predispose to an attack, and was, no doubt, partly causative in the late siege of Paris, judging from the great increase of insanity reported.

CONDIMENTS.

II.

CLOVES.—Few condiments are in more general repute than clove spice—produce of a tree growing in the East-Indian Archipelago, and denominated *caryophyllus aromaticus* by Linnæus. Whether this excellent spice was known or unknown to the ancient Greeks and Romans is disputed. Pliny writes of the *garyophyllon;* but he compares it to a peppercorn, which hardly answers to the description of our clove. The clove-tree is indigenous to the Moluccas or Spice Islands, where, as well as at Sumatra, Mauritius, Bourbon, Martinique and St. Vincent's, it is now extensively cultivated. For a considerable time the Dutch managed to restrict the growth of this valuable tree to the Moluccas, but the selfish policy has completely failed in its intent. Many parts of the clove-tree are odorous, but the cloves of commerce are the dried flower-buds; these being found to contain the odorous principles characterizing the spice more highly developed than any other part. The flower-stems, however, are nearly as strong; and these, broken up into small lengths, frequently mingle with the real cloves of commerce. The dried clove flower-bud with stem attached bears a striking similarity to a nail; hence the French name *clou*, from which the word clove is derived. The fully-expanded flower is much less pungent and spicy than the yet undeveloped bud; hence care has to be taken lest the development proceed too far before gathering. When sufficiently ripe, the buds are collected either by hand, or else by beating or hooking down—very much as wild hazel-nuts are plucked. They are either dried by fire-heat, or, what is preferable, by exposure to the sun. The chief virtue of cloves resides in a pungent volatile oil, present to such an extent that it may be forced out and made evident to the eye by pressure. By distillation most of this volatile oil may be drawn off, leaving the cloves unaltered as to shape, but of course deteriorated. The Dutch used to perform this ingenious operation, and sell the exhausted cloves afterwards. They went to work ingeniously, as the following statement will manifest. It has been already remarked that so rich in volatile oil is the clove, that exudation takes place on pressure. The Dutch operators, having extracted the odorous oil, made good the appearance of the same by a glaze of olive-oil; a practice altogether more ingenious than commendable. Commercial cloves being the undeveloped flower-buds, it follows that these, if not plucked, would grow into flowers, and the latter into fruit. The name of mother-clove has been given to this fruit, which but rarely finds its way to market. Mother-clove resembles the olive, but is smaller. Its odor and flavor are comparable to the clove, but not so strong. The Dutch occasionally make a sweet preserve of this mother fruit, and from time to time small consignments are sold in the English market.

Having a general similarity of ap-

pearance to that of cloves, pimento or allspice differs from it in being the fruit of a tree; whereas cloves, as we have seen, are the unexpanded flower-buds. Pimento is a native of the West Indies. It is chiefly cultivated in Jamaica, where the trees yielding it bound long avenues, called "pimento-walks." Being a native of America, it could hardly have been known to the ancient Greeks and Romans — Professor Clusius notwithstanding, who took allspice to be the *garyophyllon* of Pliny. The term allspice is given to pimento, because the flavor of it is said to resemble that of cinnamon, cloves, and nutmegs mingled.

Cinnamon is the bark of a member of the laurel tribe, the *laurus cinnamomum* of Linnæus. Like most of the spices, cinnamon comes from islands of the Indian Ocean; Ceylon and Java being especially celebrated for its culture. Cinnamon, in Hebrew *kinmon*, is mentioned in the Old Testament; the Hebrews having most probably obtained it from the Arabians, who at an early period had commercial dealings with India. Herodotus, among the Greeks, is the first writer who mentions cinnamon under the name of *kinnamomon*, which is said to be traceable to the Cingalese *cacynnama* (sweet wood), or the Malayan *kaimanis*. Hippocrates used cinnamon as an external application; and Dioscorides describes several kinds of it. The Cingalese cinnamon-gardens are mostly situate in the neighborhood of Columbo. The bark-peelers, or *choliahs*, only strip young branches of the cinnamon-tree. Shoots or branches much less than half an inch or more than two or three inches in diameter are not peeled. The operation is conducted by making two opposite longitudinal incisions along the bark, or if the branch be large, even more; then a knife-blade being thrust underneath the bark, the latter peels away. The bark is next set aside for twenty-four hours, when it is scraped on both sides. After a few hours, the smaller quills are inserted within the larger ones, and the whole collection sun-dried.

Cassia-bark is a spice very similar in general appearance, as also in taste, to cinnamon. On the Continent, indeed, as in the United States of America, cassia is regarded as a cinnamon, though a broad distinction is drawn in England. The flavor is much stronger than that of cinnamon, but not so delicate; and, moreover, it leaves upon the palate a certain taste of bitterness. In Germany, Russia, and North Europe generally, as also in Turkey, it is preferred to cinnamon on account of its greater pungency. Cassia-bark occurs in much larger quills than the bark of cinnamon, and, besides, when bent, will break with a clean fracture; whereas cinnamon is tough, more readily bending than breaking. How agreeable both cinnamon and cassia are as condiments, one need hardly state. We use it for flavoring certain drinks, pies, tarts, and puddings; but the chief consumption of cinnamon is in the manufacture of chocolate.

Nutmegs and Mace. — Next we come to nutmegs and mace, both spices obtained from the same tree — the *myristica officinalis* of Linnæus. Authors are not agreed as to whether nutmegs and mace were known to the ancient Greeks and Romans. It would seem that the first unequivocal reference to mace and nutmegs occurs in the works of Avicenna. The nutmeg-tree is a native of the Banda isles; it obtains a height of 20 or 25 feet, having a general similarity of appearance to a pear-tree. Not only are the nutmeg and mace highly aromatic, but also the leaves of the nutmeg-tree. Each nutmeg is closely enveloped in its covering of mace, and the whole contained in a large fleshy mass or pericarp. Nutmegs are especially liable to attack from an insect, which, however, only begins its ravages whilst the spice is yet undried. It is a great object, therefore, to complete the desiccation as soon as possible, which is effected by smoke-drying over a wood-fire for a period of about two months. When thoroughly dried the nuts rattle in their shells, which are then cracked with wooden mallets, and the worm-eaten and shrivelled nuts thrown aside. Afterwards they are cleaned either by

dipping in lime and water — the Dutch practice — or else by having quick-lime sifted over them. Mace undergoes the preparation of drying for some days in the sun; in rainy weather, however, artificial heat is employed. Mace at first is crimson or blood-red, only acquiring the golden tint so familiar to us when three or four months old. Both nutmegs and mace are peculiar among spices for a certain narcotic quality, not dissimilar to that of opium, but much weaker.

Bitter Almonds.— Our sketch of condiments would be incomplete without some reference to bitter almonds — a flavoring material of great interest from many points of view. The strong odor possessed by volatile oil of bitter almonds is familiar to most of us; yet the fact is remarkable, that none of this oil can be detected in the bitter almond itself. In this case, as in mustard, the act of crushing and mingling with water develops a new product. The volatile oil of bitter almonds is violently poisonous, owing to the presence of hydrocyanic or prussic acid; it is possible, however, to separate the prussic acid from the oil without materially lessening the power of the latter as a flavoring agent. One drachm of bitter almonds has killed a pigeon, and a small robust dog has been killed by twenty seeds. Some people are very intolerant of bitter almonds, even when administered in small quantities as a mere flavoring agent. The late Dr. Gregory, professor of chemistry at Edinburgh University, was, according to Dr. Christison, affected in this manner. After swallowing anything flavored with bitter almonds he suffered from sickness, general tremors, with, next, an eruption, like nettle-rash; at the same time his face, head, and neck would swell very much, and he would seem as if intoxicated.

The list of condiments could be made to extend indefinitely, if note were taken of every ingestive substance, not being food, that has found favor with the human stomach at various times and in different places. In this way some of the sauces, such, for example, as the *Halford Table-sauce*, for which the proprietors claim entire freedom from all injurious or deleterous properties, would have to be enumerated, and also pickles. That some nutriment is contained in articles of both these classes nobody doubts, but the condimentary function is most predominant. With a slight account of vinegar — condimentary by itself, still more condimentary when forming the basis of numerous sauces — we will conclude this notice.

Vinegar (*vin aigre*) may be chemically regarded as a mixture of acetic acid with water and certain extraneous matters, varying in nature and degree according to the source whence evolved. Most are aware of the characteristic difference as to taste between vinegar the product of wine, of beer, of cider, etc.; then, again, different wines considered amongst themselves yield characteristic vinegars. All these points of difference merely consist in a variation of the collateral things which may chance to be mixed with the acetic acid in different vinegars. Absolutely pure acetic acid is much too strong to be used as a condiment. It is nearly as destructive to the skin as so much spirit of salt. If diluted with water, then the weakened acetic acid might indeed be used like any vinegar of corresponding strength, and indeed, under the name of white or distilled vinegar, often is so used; but to the appreciation of most palates its taste is not so agreeable as that of colored or undistilled vinegar. Three distinct varieties of origin may be enumerated for acetic acid, two of which being adopted in practice on the large scale, the third only a refined chemical curiosity. It may be obtained from the fermentation of alcohol under certain circumstances well known; it may be obtained from the destructive distillation of wood, in which case the product is often called pyroligneous acid; or, lastly, it may be procured by refined synthetical processes unnecessary to describe here. Although acetic acid is a product of the decomposition of alcohol, yet the conditions under which in practice alcohol can yield acetic acid are some-

what limited. Nobody ever found rum, whiskey, gin, or brandy change to vinegar by warmth and air-exposure; again, nobody ever knew port-wine or sherry undergo that change; but the acidification of claret, beer, cider, perry, etc., is a result by no means unfrequent. These facts point to a generalization which is as follows: alcohol, in order to assume the particular fermentation which ends in the development of acetic acid, must, in the first place, be largely diluted; secondly, the diluted fluid must be mixed with some third body, which may be designated a ferment in general terms. The ferment of wine, beer, cider, etc. is a mixture of nitrogenous and colored vegetable extractive bodies. During the fermentation of vinegar a certain slimy mass is produced, to which the designation "mother of vinegar" is commonly given. Microscopically examined, it is found to consist of forms of inferior life; indeed all fermentation, so far as is known, may be referred to a vital action of either low forms of animal or vegetable life. No note has yet been taken in this place of the fact, that when sugar and water is mixed with some ferment, such as yeast, and set aside in a warm place, vinegar is the ultimate result. The fact, however, is that before sugar can yield vinegar, it must, if cane-sugar, first be converted to grape-sugar, and thence to alcohol.

The circumstance may seem remarkable, that although vinegar is perhaps the most commonly met with of all vegetable acids, yet the examples are very few in which it is found ready formed in sour fruits. Excellent vinegar can be made by the fermentation of cider: hence the inference might be that sour apples owe their sourness to already developed vinegar. Not so: the sourness of sour apples is mostly due to the presence of malic acid, never to vinegar. The sourness of lemons is due to the presence of citric acid — indeed lemon and lime-juice are the usual sources of crystallized citric acid, though much is obtained from red currants. Racemic, malic, oxalic, and many other acids conduce to the sourness of fruits and leaves; but hardly ever, if ever, acetic acid.

ON POISONS.

BEFORE proceeding to consider a few of the most important organic poisons, it will be well briefly to allude to two classes of mineral substances which are well known, and which have been used as poisons. The strong mineral acids, commonly called oil of vitriol, muriatic acid, and aquafortis, when taken internally, act as irritant and corrosive poisons; they destroy the tissues rapidly, and if taken in large doses, cause death in a few hours. Sometimes, however, the patient lingers for some weeks, and even if he recover, suffers for years, perhaps all his life, from deranged digestion. Such results must manifestly happen from the nature of their action, which is to disintegrate those membranes and glands which are essential to the work of digestion. The general symptoms produced by all these acids are very much alike; they produce great pain immediately we swallow them — as they burn the hand or any external part, so they burn the throat, gullet, and stomach, and the pain produced is more intense, because the injured surface is more sensitive. The countenance, from the great pain, expresses anxiety, the pulse is small and quick, the breathing laborious, the lips shrivelled and burnt, the inside of the mouth is white, and generally exhibits external marks, produced by the acid, and visible on the face, especially about the chin and neck.

The best treatment is to give magnesia, chalk, or whiting, to neutralize the acid; milk is recommended as a vehicle for their administration, though they are generally suspended in water. Mucilaginous drinks may be given freely as well as oil, so these latter may

be continued for some time. It is dangerous to use the stomach-pump, as the parts are by the acids so much softened and destroyed. Leeches are sometimes applied to subdue inflammation, and bleeding may be found necessary.

After death, it is found that great destruction has been caused by the acid to the alimentary canal, the stomach is often perforated, and the membrane which lines the abdominal cavity is often found to be highly inflamed, even if no perforation of the stomach has been caused. The differences between the three acids are in some respects very marked, though their actions on the body are similar. Oil of vitriol is a heavy oily liquid, generally brown from the effects of organic matter, but when pure it is colorless. It is used for cleaning copper vessels, and for other domestic purposes; in the dilute state it is used as a medicine, and has astringent properties. It is given in hemorrhages, and as a tonic in extreme debility. It is also supposed to be efficacious in stopping diarrhœa. When vegetable substances are put into it, it chars them. If poured into a strong syrup it first turns it brown and then black; the action is violent, and attended with great evolution of heat. Oil of vitriol, like other acids, reddens blue litmus paper, and changes the color of black cloth to red. If the acid be strong when dropped on cloth or linen, it does not dry, as one of its properties is to absorb moisture. The red color which it causes when it acts on black cloth is destroyed by ammonia, and the black color is restored. These points are of importance, in medico-legal inquiries, as furnishing evidence of the nature of the poison which has been taken.

Oil of vitriol (hydric sulphate) is detected by the white precipitate which it gives with a soluble salt of barium, and which is insoluble in all acid liquids. When this precipitate is heated with charcoal and dried carbonate of soda, it is reduced, and a sulphide is formed which evolves sulphuretted hydrogen on the addition of an acid liquid, the sulphuretted hydrogen being detected by its smell, or by its blackening paper moistened with plumbic acetate. When mixed with organic substances, they should be diluted with water and filtered; to the filtrate, chloride or nitrate of barium should be added, and a white precipitate will be formed if oil of vitriol or any other sulphate be present. Hydric sulphate may be separated from hydric chloride, and hydric nitrate by distilling from a dilute solution at the temperature of a chloride of calcium bath; the two latter acids are volatile at such a temperature, and pass over, leaving the hydric sulphate behind. Sulphates may be present which have been administered as antidotes, such as sulphate of zinc, or if lime has been given, sulphate of lime will be found. And here it is necessary to consider the symptoms and post mortem appearances, for in cases of poisoning by oil of vitriol they are very distinct, and lead, if oil of vitriol in any quantity be found on analysis, to the conclusion that it was the cause of death.

Aquafortis, or hydric nitrate, is not often taken or administered as a poison. The symptoms which it produces are like those resulting from taking oil of vitriol, as also are the post mortem appearances; it is not, however, so corrosive in its action, and therefore perforations of the alimentary canal are not so common.

Muriatic acid, or hydric chloride, commonly called spirit of salt, has in a few cases been used as a poison. The effects it produces are similar to those already described for the other acids. Like oil of vitriol, it makes red spots on black cloth, and the color of the cloth is restored by ammonia. Soluble chlorides give a white precipitate with nitrate of silver, soluble in ammonia, insoluble in hydric nitrate. When heated with hydric sulphate and manganic oxide, chlorine is evolved.

The caustic alkalies and their carbonates, when taken in the concentrated form, act as instant and corrosive poisons. When swallowed, they produce a burning pain in the throat, violent pain in the stomach, colic pains and purging. The abdomen becomes

tense and tender on pressure. Death generally takes place after a few hours, the patient dying in a state of collapse. From the caustic nature of the poison, the passage from the mouth to the stomach becomes constricted, and the person, after a time, dies of starvation. Acid drinks are given as antidotes; vinegar, lemon-juice, and soothing liquors, such as oil, may be freely administered. If inflammation set in, it must be specially treated. As in poisoning by acids, and for the same reasons, the stomach-pump should not be used. After death the marks of a corrosive poison are distinctly visible in the mucous membrane of the mouth, which is in part destroyed and softened; there is ulceration and extravasation of blood. The alkalies have not been known to produce perforation. Caustic potash occurs in various forms, in lumps, flat masses, and in circular sticks about the diameter of an ordinary pencil; it is very soluble in water, and also readily takes up moisture, becoming damp; it is a deliquescent substance. It is also kept in liquid under the name of liquor potassæ, and is used in medicine. It is detected by giving a yellow precipitate with the tetra chloride of platinum, it having been first converted into the chloride of potassium. In this respect it resembles ammonia.

Ammonia is very rarely used as a poison. It occurs as liquid ammonia, and as sesqui-carbonate of ammonia; it is easily detected by its smell. Ammonia gas has sometimes caused death by producing suffocation. When a salt of ammonia is heated with caustic soda or potash, ammonia is set free, and can be recognized by its powerful odor. Ammonia gas, when it comes in contact with the fumes of hydric chloride, renders them very white and dense, and this is sometimes used for its detection. When ammonia has to be sought for in organic liquids, they should be first mixed with caustic soda and distilled; the ammonia will come over in the form of gas, and can be condensed in water, in which the gas is very soluble.

Oxalic acid is a well-known poison; it is cheap, and very active when taken in sufficient quantity, and is used extensively in manufactures. It is a poison rather used by the suicide than the murderer, owing to its strongly acid taste, for sufficient to cause death could hardly be administered without the victim perceiving it. It has sometimes been the cause of accidental poisoning, from its resemblance, in appearance, to sulphate of magnesia (Epsom salts), though its taste is very different — Epsom salts having a bitter and peculiar flavor. Oxalic acid is found in common sorrel (*oxalis acetosella*), not, however as the acid, but as the acid oxalate of potassium. Other plants contain it, the barilla plant, in which it exists as oxalate of sodium; it is also found in common rhubarb. It is prepared on a large scale by heating sawdust with caustic potash; the potash is usually mixed with soda, as the mixture of the two is found to be more profitable. The alkali soda does not furnish the acid, and potash, if used by itself, would be too expensive. After the action is completed, the soluble salts are dissolved out from the mass, and the oxalate of sodium, which is not so soluble, is left. The alkalies, after proper treatment, are again prepared for further use, but the oxalate of sodium is boiled with lime, and the insoluble oxalate of calcium is formed; this is treated with oil of vitrol, which decomposes it, forming sulphate of lime and oxalic acid, which is crystallized out from the solution. The usual method of preparing oxalic acid is by the oxidation of sugar or starch, by hydric nitrate. The two are heated together in a retort; carbonic acid and nitrous fumes are given off. After the action has continued sufficiently long, the liquid is evaporated, and the oxalate crystallizes out. From the fact that oxalic acid was made from sugar, it received the name "acid of sugar." Oxalic acid, when pure, is entirely dissipated by heat, it breaks up into carbonic acid, carbonic oxide, and water. When heated with hydric sulphate it is decomposed into the same compounds, the carbonic acid and carbonic oxide escaping, while the water remains be-

hind with the hydric sulphate. Oxalic acid is largely used by calico-printers, and is very effectual in discharging the color of ink-stains from wood or linen. About half an ounce of the acid is a poisonous dose. When taken in this quantity it produces vomiting, causing a burning sensation in the throat; the vomiting, however, does not always occur; the patient experiences great pain over the region of the stomach, and generally dies in a state of collapse. There are other symptoms more or less regular in their occurrence — such as perspirations, quick breathing, great prostration, from which it is difficult to arouse the patient, extreme pain in the abdomen, and numbness in the limbs immediately preceding death. The matters vomited are usually green or black, and contain altered blood. After death the mouth and throat, which have been affected by the acid, are white, the mucous membrane which lines them is disintegrated, it is soft, and easily removed. The blood-vessels are filled with dark blood. The stomach is sometimes inflamed, at others pale, like the mouth and throat. A dark-colored substance is sometimes found in the stomach, and the upper part of the intestines is frequently inflamed.

Where the dose taken is very large, the stomach often presents an appearance similar to that produced by oil of vitrol. Oxalic acid does not seem to be a corrosive, though it is an irritant poison; perforation of the stomach is rarely produced by it. When a person has taken this poison, the best treatment is to administer lime in the form of chalk, or in solution in water mixed with oil. If chalk cannot be obtained, the scraping of the ceilings or walls may be administered, suspended in water. Lime in any form is the best antidote, as oxalate of lime is insoluble in water. Emetics may be administered with advantage, if the poison has not already produced sickness, and the stomach-pump should be resorted to, but care should be taken not to injure the throat, which has been rendered tender by the acid. The action of oxalid acid is so rapid, that, what remedies are employed, should be used quickly. Alkalies must not be given, as their oxalates are very poisonous. Death from the direct action of oxalic acid has occurred within twenty minutes, or it may be delayed for several hours. The secondary effects have not, in one case, proved fatal till after twenty-three days. Bin-oxalate of potash, commonly called "salts of lemons," is quite as poisonous as oxalic acid; the symptoms which it produces are the same, as also are the *post mortem* appearance which it leaves behind. Half an ounce of this salt is a fatal dose, and the treatment to be employed in no way differs from that recommended for poisoning by oxalic acid. In the solid form, it has been said that oxalic acid resembles sulphate of magnesia; it is also very like sulphate of zinc. In the mass, however, its crystals look more opaque than those of either of these substances. It is, however, easy to distinguish between them by the taste; oxalic acid is sour, magnesic sulphate and zinc sulphate are bitter — all three are soluble in water. If ammonia solution be added to a solution of each of them, it will produce no apparent effect on the oxalic acid, but it will throw down a white precipitate in the solution of the zinc salt, which is soluble in excess of ammonia, and with the magnesia solution it gives a white precipitate, not soluble in excess, but which is dissolved by muriatic acid, from which solution it cannot be reprecipitated by ammonia. With caustic potash or soda dissolved in water, oxalic acid gives no precipitate, but both the other substances do; the zinc precipitate, however, being soluble in excess of the alkali. Heat also serves to distinguish between them; it completely dissipates oxalic acid, but only drives off the water of crystallization from the other two salts, so that a white powder is left behind.

A BABY should be laughing and playing, feeding or sleeping, all its time, for it wants more air, food, and sleep than we do. Its face should never be covered with clothes.

MEDICINE IN CHINA.

THE Chinese commence their theory by maintaining that man is a *Seaou-teen te*, a little heaven and earth—a world in himself—an universe in miniature—a microcosm. With respect to the greater universe—viz., the system of nature, as it appears in celestial and terrestrial phenomena, the Chinese teach that there is an eternal and necessarily existing power, or principle of order, which they call *Taekeih*, and which may be translated by an indefinite and vague expression, such as—"the eternal," or "infinite principle."

This eternal principle, in their view, is merely the first link of the great material chain—a being distinct from the universe, nor is it endued with any moral perfections.

They represent this first cause, this first link of the chain, by a circle.

But as they find it difficult to account (from what they see in nature) for all the appearances which present themselves, on the supposition of a simple homogeneous body, acting on itself, they suppose that, when the present system of nature assumed the form it now possesses, the one eternal principle was divided, and became a Dual power, or two powers, called, in their language, *Yin* and *Yang*, which is represented by a figure of a circle divided by a waving line across the centre.

This figure is very commonly seen, as a sort of sacred ornament, on various occasions amongst the Chinese.

From all that can be ascertained of the original import of the words *Yin* and *Yang*, it would seem that they are most nearly translated by calling *Yin* a *Vis Inertia*, and *Yang* a *Vis Mobile*.

Yin, the Chinese consider to be of the *feminine* gender, and attribute to it darkness, weakness, passive and inferior qualities.

Yang, they regard of the *masculine* gender, and attribute to it light, strength, active and superior qualities.

To one or other of these Dual powers, all existences in the universe (and, by the way, all numbers) belong.

On the regular action of these two powers reciprocally, the order and harmony of the universe, both naturally and morally, depends. Excess or defect in their power, introduces disorder and confusion into the system of nature and the affairs of mankind.

A due reciprocal action of these on each other, preserves the harmony of the system, which is health; excessive or defective action in either power, causes disorder, or disease; and high degrees of excess or defect cause death.

The Chinese maintain that in animated matter there exists certain affinities and repulsions in reference to all nutriment taken into the stomach.

The *Viscera* of an animal body are divided into five classes, or, as Du Halde calls them, "noble parts:"—the *kan*, *sin*, *pi*, *fi*, *shin*, liver, heart, spleen, lungs, and kidneys—the latter sometimes includes the pancreas and stomach.

The *Materia Medica* are all classed under one or other of the five elements; those that belong to wood, have an influence on the liver; caloric, on the heart; earth, on the spleen; metal, on the lungs; and water on the kidneys.

Again, tastes are divided into five—viz.—sour, sweet, bitter, acrid, salt.

The five tastes have certain affinities to the five elements, and to the five viscera; the affinities are these:—

Sour, to wood and the liver; sweet, to the earth and the spleen; bitter, to heat and the heart; acrid, to metal and the lungs; salt, to water and the kidneys.

The Chinese divide their colors into five; and refer red to heat and to the heart.

The five colors are these:—*Tsinge*, *hwang*, *chih*, *pih*, *hih*, green, yellow, red, white, and black; and the affinities are these:—

Green is related to wood, and affects the liver; red to heat, and affects the heart; yellow to earth, and affects the spleen; white to metal, and affects the lungs; black to water, and affects the kidneys.

INJURIES AND DISEASES OF THE LIDS AND EYE: THEIR GENERAL CARE AND TREATMENT.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

I HAVE previously spoken of all sorts of foreign bodies getting into the eye and adhering to the eyeball, or lying concealed under the lids, and how these can be seen and removed; such as specks of dirt, or coal, cinders, particles of metal breaking off from tools in the workman's hands, or pieces of stone or emery flying from rapidly revolving polishing wheels, etc. When these simply adhere to the eyeball or lids, they are, as I said, frequently readily removed by some fellow-workman, who has acquired some skill or reputation for this sort of thing in the particular establishment where the accident occurs. When, however, any foreign body has penetrated the delicate skin lining the lids and eyeball, or the clear part of the eye in front, the cornea, then their removal is quite another and more difficult manœuvre. Only too many days' work are lost, and even eyes destroyed, by ignorant and unskilled "working" on such "somethings" in the eye. If the method I have previously described does not succeed in removing a foreign body that is stuck in the eyeball, the best surgical advice should be sought at once, as every hour of delay is one of increasing danger. Young eyes, a steady hand, and experience in detecting and removing these substances, are required on the part of the surgeon. Jack-knives, pins, steel pens, etc., are not the instruments he uses for this purpose, and therefore can hardly be more efficacious in the hands of those who, nevertheless, constantly employ them to "worry out" an offending splinter of stone or metal from some fellow-workman's eye.

INJURIES OF THE LIDS.

The bites of many insects, the poison of some plants, such as *arnica*, now so frequently prescribed and used, will cause the lids to swell up so as to close the eye, and frighten the patient and those about him. But there is generally no injury done to the eyeball, and hence no danger for the sight. Blows over the eyes, a "black eye," produce also swelling of the lids not in any way dangerous, provided the eyeball has not been pressed or crushed. When the lids have been bruised or cut by injury, surgical advice should, if possible, be always at once sought, since the separated parts must be brought most carefully together, that they may unite and prevent what so often occurs, namely, deformity, discomfort, or destruction of the globe from the loss of its necessary protection, the lids. All burns on the outside of the lids are especially dangerous, because

the contractions of the skin after healing may distort the natural and necessary curve of the eyelids, to adapt them to the eyeball.

INJURIES OF THE EYEBALL.

Some sudden, violent exertion, sneezing, coughing, a blow, etc., may cause an effusion of blood under the delicate membrane covering the eyeball, and change the white of the eye to a blood-red, giving rise to anxiety. Such an effusion, if it is only this, is of no consequence, as the blood becomes absorbed in a few days. Cold water is the only application which should be made. Poultices, spirit and water, arnica, quack medicines, etc., only retard nature's cure, and may do irreparable mischief. They will, however, all be used, so long as the newspapers recommend proprietors' advertisements of patent medicines in their columns, and old herb-women, with the whole tribe of quack doctors and venders, sell them.

Blows on the eyeball that have not caused any apparent harm — I mean no bruise, or redness, or noticeable change — frequently produce extreme pain, and temporary dimness, or loss of sight, with inability to bear the light. The tears flow rapidly, and the lid is kept tightly closed. If this state of things last but a few hours, the eyeball may escape harm, but such an eye should be most carefully watched, as dangerous inflammation steals on most insidiously. Such blows come from corks flying from bottles, pieces of wood jumping from the block, balls thrown in games, etc.

Shaking of the eyeball from a blow may, without any visible external injury, be followed by immediate partial or total loss of sight, and the pupil be seen dilated. A continuance of this state of things for more than an hour or two, points to some internal injury which the concussion has produced, a rupture or tearing of the iris, or some of the internal membranes, or a dislocation of the crystalline lens. Sometimes a blow on the eye causes temporary pain, which passing off, and the sight remaining sufficiently good, the person continues his occupation, and in a few days is suddenly stricken down with intense pain and inflammation in the globe, that only too rapidly destroys the eye forever. In such a case some accident has occurred within the eyeball, which the ophthalmoscope would have revealed to the surgeon, and proper treatment have prevented from resulting in harm. The only treatment for all these forms of injury till proper advice can be obtained, is a rag wet with cold water laid over the eye, and possibly one or two leeches applied to the temple, not near the eye, but back just in front of where the hair grows; with, of course, rest and quiet on the sofa or bed, and avoidance of light

and the use of the eyes. Such a plan of treatment would often save eyes now only too frequently sacrificed to prejudice, ignorance, and licensed quackery.

Penetrating Wounds and Rupture of the Eyeball.

When the eyeball has been hurt by a blow, or cut open by a sharp instrument or fragment of metal or glass, immediate proper care is necessary, which the ophthalmic surgeon alone can give. Poultices and washes of all forms generally succeed in destroying the eyeball. The crystalline lens may be partially or wholly dislocated, requiring an operation for its removal, or it may have been touched by the instrument causing the injury, and then become gradually opaque, thus forming a cataract that only an operation can remove. Blows and cuts may also produce bleeding within the eyeball, even when this is not apparently much, if any, injured. Such effusion of blood is seen by the ophthalmoscope inside of the globe; and although sight may be temporarily lost, the surgeon will be enabled to tell his patient that useful vision can once more be restored.

Wounds and cuts of the white of the eye and the clear part in front, or cornea, are likely to allow the colored portion of the eye, which is a delicate vascular membrane, to protrude, and become fastened in the wound. The pupil is then partly closed or drawn together, so that an operation becomes necessary to free the iris, or form an artificial pupil. Simple puncture of the clear part of the eye, or cornea, when caused by a fine sharp instrument such as a needle, rarely does much harm in the end, although all such wounds need the best of care for a short time. When the cornea has been cut through by some rough or irregular instrument, there is much more danger. In all such cases, without the best surgical advice nothing should be applied to the eye except a rag kept wet with cold water, and the person should remain quiet in a darkened room till assistance can be obtained. Proper treatment the first day may save the eye.

Abrasion of the Cornea.

When the transparent part of the eye has been scraped or dug by a blow from a switch, some foreign body flying against it, or the scratch of a child's finger nail, — a baby in arms, for instance, — it is a much more serious accident than the person so injured would imagine. Generally the pain is so great and so continued, that they soon seek advice, and are fortunate if that which they obtain is correct. Till proper advice can be sought, it is safest to avoid the light, to keep the eye quiet, but not bandaged or poulticed; a rag wet with cold water over it, and, if proper

surgical advice cannot be soon had, a solution of one grain of sulphate of atropia in two teasponfuls of distilled water, may be dropped into the eye three or four times a day. Atropia, or belladonna, as it is called, dilates the pupil, and makes the "sight look large," as people say; it also blurs the sight for near objects. This is, however, only temporary, while the medicine is being used, and disappears in a week or less after the application is stopped. Sulphate of atropia is a *poison*, and care must be taken not to let a solution of it run into the mouth, or leave the bottle round for children to get hold of, or grown people to mistake for something else. These sort of injuries of the cornea are apt to produce, like ulcerations from disease, a white opaque spot, which is, in reality, a scar, and cannot be removed by art. If some one of the various "eye-waters" constantly offered for sale in all the apothecaries' shops, together with other quack medicines, is used when the cornea has been scratched or bruised, there is pretty sure to result a permanent white spot; ***not a scar***, but a deposit of sugar of lead, which these quack eye-waters generally contain. This film, or deposit, can rarely be removed by the surgeon; and, of course, in proportion to its extent, produces more or less blindness.

Foreign Bodies within the Eyeball.

The most dangerous thing which can happen to the eye, is the lodgement of some foreign body within it. Amongst all classes of mechanics, such injuries are constantly occurring, from chips of metal flying off from the instruments they are using, or the work on which they are employed. So also in the stone-workers, metal-grinders, polishers, engineers, etc.; all of whom are thrown out of employment by the loss of an eye, and reduced from comparatively affluent circumstances to almost beggary. Amongst children, pieces of percussion caps, pins from the ends of darts, small stones or shot from bow-guns, etc., only too often strike the eye with sufficient force to penetrate and destroy the globe. It is impossible for a person himself, or those about him, to decide whether a piece of iron, or other foreign body, has entered the eyeball and *remains* there. This the ophthalmic surgeon alone can do, by looking into the eye, through the pupil, by means of a peculiar mirror, called the ophthalmoscope. He can then see the foreign body, and perhaps make a drawing of it, which the patient may recognize as corresponding to the portion which has flown off from the instrument or tool he was using at the time he met with the injury. Now this deciding whether or not the foreign body is in the eyeball, is ***all important***. If it has merely cut a hole in the eyeball,

and dropped back out of the eye, the patient may escape with perfect vision; but if it, no matter how small, has entered the eyeball, there is not one chance in a million of the eye's being saved, and an even chance whether the other eye is not also lost, from what is called sympathetic inflammation attacking it. In many parts of the system, a foreign body, like a needle, splinter, bullet, etc., may remain perfectly quiet and do no harm. Not so, however, in the eye; here it is fatal to sight in the injured, and perhaps the other eye also. Its presence may at once destroy the eye by exciting acute and active inflammation. After such destruction, and when only a stump of the eye is left with the foreign substance in it, this remaining portion of the globe is liable, at any time, to repeated attacks of inflammation. Even if the sound eye has not been previously attacked, in some one of these outbursts of inflammation in the stump, this insidious and dangerous sympathetic trouble comes on; taking at first the form of *weakness*, inability to bear the light, slight pain and discomfort. These symptoms increase in severity, and a gradual change takes place,—the eye degenerating, and sight being lost. The only remedy for such sympathetic inflammation, is the removal of the cause, namely, the eye, or the stump, with the foreign body in it. This, if done too late, may not save the second eye. *An eye with a foreign substance within the eyeball, never should be allowed to remain.* The present operation for its removal is so simple and effective, and the subsequent wearing of an artificial eye so facilitated, that there need be, in these days of ether, no fear or dread of the operation. It is only in the rarest instances that a foreign body has been removed from within the eyeball. A glass eye can be worn, generally, within a fortnight of the removal of an useless or painful stump or globe. Cold water, and the solution of atropine, above alluded to, are all that can be recommended, besides quiet, and protection from light, before proper surgical assistance is obtained.

Gunpowder Injuries.

The effect of these I must explain as they come from fireworks, guns, pistols, blasts, etc. There are different ways in which injury is done the eye. The concussion of the air near the eye may destroy or greatly injure it. The lids and the globe may be burnt by the powder. The grains of powder may be driven into the skin of the lids and external tissues. And finally, the grains of powder may be driven with force enough to penetrate the globe, and thereby cause such results as I spoke of from foreign bodies within the eyeball. No time should ever be lost in obtaining

the best surgical aid for a person whose face and eyes are injured by a powder explosion; and in the meantime, sweet oil applied to the lids and eyes, a rag wet with cold water over these, and the dropping in every four hours of the solution of atropia, before alluded to, are all I can recommend. When seen early, much of the powder adhering to the eyeball can be removed, saving, thereby, perhaps the organ and sight with it. I cannot speak too strongly *against* the use of *everything else* than what I have described. I have seen so many eyes sacrificed to prejudice, ignorance, and stupidity, that I here again warn against poultices, washes, eye-waters, and all descriptions of patent medicines, *outside* or *inside*.

DEFECTIVE CHIMNEYS.

FEW things are more annoying than a smoky chimney. Where such exists the architect has been at fault, and it is a fault that does not always admit of remedy without disfiguring a building by the addition of unsightly chimney-pots. It is a somewhat significant fact that at the present day architecture seems to partake more of the decorative than the useful, external carvings and internal painting and moulding occupying far more of the attention of architects than the proper proportions of chimneys, or even the arrangement of doors and windows with regard to a due adjustment and distribution of currents of air. Hence it is no uncommon thing to find rooms in which it is impossible to avoid sitting in a draught, and sometimes they will be found with doors, windows, or chimney occupying every side. In ordinary designs and details of buildings, whilst cornices, copings, mouldings, and other decorative particulars will be found to have been given in fullest detail, calculations as to the relative proportions of the different chimneys in their sections with reference to their respective heights are rarely to be met with; neither do architectural works, as a rule, devote sufficient attention to the subject. The draught up a chimney, and consequently its power to perform its proper duties, is to a very great extent dependent upon its proper construction; that is, upon the proper relative proportion of its section to its height, due regard being of course paid to the size of the fireplace, range, or stove below, which is again regulated — or ought to be regulated — by the size of the room in which it is placed. It may be taken as a rule that no chimney should be perfectly straight, so that by looking up it daylight may be seen, but there should always be one bend in every flue close to its lower extremity.

This answers a double purpose — firstly to baffle any down draught which may be sometimes caused by a sudden gust of wind, and secondly, to prevent the too rapid ascent of heat, which may otherwise be carried away into the air without having fulfilled its proper functions in warming the room wherein the fireplace is set. This causes a waste of power, and consequently an extravagance of fuel.

When once chimney flues are built they are sometimes incapable of correction, and hence arises the necessity of disfiguring a building by external additions of crooked zinc pots; whereas the locality of the fault lies at the bottom, instead of at the top of the chimney. In old times the chimney stack constituted an ornamental feature in a building, but now it is too often hidden behind a portion of the roof, or rendered conspicuous by abortive excrescences, in utter defiance of all æsthetic considerations.

One of the important functions of a chimney being that of carrying off

smoke and other objectionable products of combustion from the fireplace or stove, and of discharging them in the open air at a point where they can cause no annoyance instead of allowing them to escape into the room, any defects of construction which tend to interfere with the proper discharge of that duty constitute a nuisance with which unfortunately most people have a more or less intimate acquaintance. A smoky chimney which owes its defects to a faulty construction, is an evil for which no sovereign remedy is applicable. Each case must be dealt with upon its own merits, and that after a scientific investigation, and not as a mere hap-hazard experiment. As a general rule, excepting where the chimney smokes in consequence of insufficient height, or from being overtopped by some adjacent building, the remedy should be applied at its lower, and not at its upper extremity. This will often necessitate the removal of the grate, and prove altogether a dirtier and longer job than the addition of some hideous cowl or patented chimney pot, but it will also be more certain of success, and therefore both cheaper and better in the long run. It is a rather remarkable fact that inventions for the cure of smoky chimneys almost always aim at attacking the evil at the upper extremity instead of where it really exists, ninety-nine times out of a hundred, namely, at the base of the chimney.

As has been before remarked, defective ventilation in a house is often the cause of greater anoyance than is usually imagined. Applying as it does in no small degree to the question now under discussion, we shall see that it may be the cause of smoky chimneys as well as of a defective combustion in fireplaces. For all combustion a certain amount of air is required, and the more air that is supplied within certain limits the faster will the process of combustion be carried on. With the view therefore of furnishing a proper supply of air to each fireplace without affecting the distribution of the currents throughout a house, far more careful consideration is required than the question generally receives. In the first place it is no uncommon thing to find that a fire will only burn properly if a door or window be partially opened; in another case it is impossible to open either door or window without inducing so violent a draught as to render the room unpleasant, if not unhealthy, to inhabit; again, many of our readers are no doubt acquainted with instances where it is impossible to have two fires in certain rooms burning at the same time, for the draught in one flue being insufficiently supplied from other sources maintains a down draught in the other, and so draws all the flames and smoke into the room, instead of their going properly up the chimney. These and many other similar instances might be cited as results due to defective ventilation, and influencing the comfort of a house by affecting the proper discharge of the duties of the fireplaces and chimneys. This is a subject the cause of which it would be impossible to investigate here more fully, or to lay down rules for its avoidance. In all cases, however, it may generally be presumed to arise from want of proper proportion in the several parts of a building.

Where bad setting of a fireplace or grate alone interferes with the proper discharge of its functions, the remedy would, *primâ facie*, appear easy and simple enough, but in connection with this subject should also be included badly shaped fireplaces. The records of the Patent Office bear ample testimony to the amount of thought and consideration which has been given with the view of producing a perfect fireplace. A merely casual investigation will, however, enable any one who has studied the question to observe that most of the so-called inventions are the results of "ideas," and not of scientific application. When a grate has to be set, it is commonly given to the builder's men, who proceed to fix it in the absence of any superior supervision. Under these circumstances the results may be satisfactory, but it can scarcely be a subject for surprise if they should turn out otherwise.

All chimneys should be kept scrupulously clean, for when foul they will

often prove a nuisance by preventing a proper draught, and occasionally, especially in wet weather, by ejecting soot into the room. By no means should any flues be left unswept after the fires are discontinued for the season, except where anthracite coal has been the principal fuel used.

TRICHINATOUS PORK.

EXCEPTIONALLY an unclean animal, domesticated, yet wild, stupid, stubborn, ugly, repulsive, and inheriting no trait calculated to enlist the sympathies of either Jew or Gentile, the hog nevertheless claims some attention from sanitarians on account of the deadly effects which the consumption of its flesh, when parasitically contaminated, occasions among those who under such circumstances use it as food. Revelling in filth and delighting in gluttony as no other quadruped does, it lays itself peculiarly open to disease. Accordingly we find that it is the only one among the inferior animals afflicted with measles and leprosy.

At the present time pork forms a very large proportion of the animal food of the world, and it certainly possesses some virtues which deservedly entitle it to a rather prominent position. In cold weather, to the North American, European, and northern Asiatic, the moderate consumption of sound pork imparts a genial heat, whilst the ease and speed with which it can be cured by means of salt or sugar have made it one of the great food resources of the poorer classes, and for the sustenance of the navies and armies of all nations. Compared with some of our chief nutritious supplies derived from animals, except in the matter of fat, it occupies indeed the lowest place, as the following analysis from Chambers's Encyclopædia shows :*

But as every rose has its thorn, so every animal owns a parasite. To the pig we are indebted for two of the most repulsive and dangerous worms ever introduced into the human system — the *tænia solium*, or tapeworm, and *trichina*. It is to the latter that we particularly call attention, as the people of this country are frequently in the habit of partaking of cold sausages and uncooked pork relishes, liable to contain this deadly parasite. The *trichina spiralis* seems to have been first observed by Tidemann in the year 1822, but was not described until 1835 by Owen. Between the latter date and 1859 this worm remained very much of a dissecting-room curiosity, and was not regarded as dangerous; but immediately afterwards the Prussian doctor Virchow had no less than six patients suffering from trichinatous disease in one year. Fear and interest were at once excited, especially as Zeuker, another Prussian medical man of repute, showed that the migrations of trichinæ among human muscles, so far from being harmless, as had hitherto been believed, produced symptoms of the most agonizing kind, inducing death even in the strong and healthy within a few weeks after the sufferer had eaten contaminated pork. Dr. Philip Frank, of the English Army Medical Department, was the first to remit an account of this terrible disease from Germany. It appeared in the *Medical Times and Gazette* of May 26, 1860, of which the following is a condensed account: The girl whose sufferings are detailed, was a servant at a farmhouse, where two pigs and an ox had been killed about Christmas of the previous year. She fell ill soon after having eaten some ham and sausages, and complained of extreme lassitude, depression, sleeplessness, loss of appetite, and other symptoms, which earned for the case the name of typhoid fever. Presently her whole muscular system suffered from excruciating pain, espe-

	Veal.	Beef.	Mutton.	Pork.
* Mineral matter,	4.5	5.0	3.5	1.5
Gelatine,	7.5	7.0	7.0	5.5
Fibrin and Albumen,	9.0	8.0	5.5	4.5
Fat,	16.5	30.0	40.0	50.0
Water,	62.5	50.0	44.0	38.5
	100.0	100.0	100.0	100.0

cially towards the extremities. Dropsical swelling of the limbs followed, the poor girl perishing miserably on or about the thirtieth day from the commencement of her illness. A *post mortem* examination revealed myriads of trichinæ alive in all stages of development in every striated muscle, not even excepting the heart. Hearing of the occurrence, Professor Zeuker visited the farmhouse and obtained some of the same ham and sausages which the unfortunate girl had eaten, when he discovered that both were infested with the parasite in the encysted condition. He also learned that soon after the girl became ill, the housekeeper and all the other servants were prostrated, although they ultimately recovered after more or less suffering. The butcher who had officiated was confined to bed for three weeks, troubled with what was said to be rheumatic pains in the limbs, arising no doubt from trichinatous infection, the result of the well-known, but reprehensible habit, which prevails among German butchers of tasting in a raw condition all meat that they slaughter.

But a more terrible scene was yet to be enacted. In October, 1863, at the little town of Helstädt, in Prussia, on a festive occasion, 103 healthy persons dined together. Before a month had elapsed 20 had died of trichinatous disease, 80 were in the excruciating agonies of the fearful malady, while the remainder, not yet attacked, lived in continual terror of the fatal worm. Case after case perished lingeringly and horribly, as, although most of the leading physicians of the country were consulted, none were able to cure or even assuage the pangs of the dying. At first it was suspected that the distemper was the result of intentional poisoning, but microscopical investigations of the remains of the feast revealed the cause of all the suffering and death. The damage had been done at the third course of the dinner, consisting of *Röstewurst*, or smoked sausage meat, which on examination turned out to have been made from an ill-conditioned pig, and swarmed with encapsuled worms. Attention was once more directed towards the perishing sufferers, small portions of their muscles were excised and subjected to the miscroscope, when the tissue was also found thronged with trichinæ in all stages of development.

It must not for a moment be supposed that the object of the present article is to convey alarm. On the contrary, it is simply to place the public on their guard. But in these days, in which cheapness is too frequently achieved at the sacrifice of purity or care in the selection of the various articles of human food, no precautions can be unnecessary. This will be evident when it is stated, on the authority of Professor Kühne, of Halle, who was intrusted by the Prussian government in 1865 to investigate the disease, that "pigs affected with trichinæ do not present symptoms sufficiently obvious to be recognized by the breeders. The process of boiling or roasting should be carried on with the greatest care. People should not partake of any meat that has not been sufficiently cooked, and should avoid all roast pork which presents traces of blood."

Previously to the appearance of the above in print, Dr. Thudichum, at a conversazione of the British Medical Association held at Downing College, Cambridge, on the 4th August, 1864, exhibited living trichinæ in various stages of development, which he obtained from the muscle of a rabbit, and from a pork chop.

That they are remarkably tenacious of life, will be seen from a communication made by Dr. Cobbold to the *Lancet* on the 13th of January, 1866. He says, "'Cook your pork thoroughly,' is not bad advice; but the question arises, 'What is thorough cooking?' On this important point I have to remark that the application of very considerable heat is probably rather favorable than otherwise to the development of these entozoa. Recently on dropping hot water, almost boiling, over living non-capsuled trichinæ under the miscroscope, I found that the only effect was to make the little worms more active. Deter-

mined to kill some of them, I boiled a minute portion of human trichinized muscle for more than five minutes. The fragment contracted almost to the consistence of leather, yet on subsequently breaking up the trichina capsules the flesh-worms appeared uninjured."

Early in 1867, the *Springfield Republican* gave an account of six cases of trichinatous disease which occurred in one family in that place, caused by eating contaminated uncooked ham. A few days afterwards the symptoms of disease began to appear — pain and swelling of the eyes, agony in the stomach and bowels, vomiting, diarrhœa, and profuse perspiration. Afterwards the limbs of the sufferers became rigid, the least movement causing unspeakable torture. One of the daughters, an interesting girl of seventeen, died after a fornight's suffering. In a small portion of muscle examined *post mortem*, trichinæ were found swarming to the fearful extent of from 50,000 to 80,000 per square inch. Towards the end of the same year, trichiniasis having reappeared at Berlin, and seventy persons being at one time ill from having eaten of pork bought from one butcher, Drs. Weiss and Weissner, of Vienna, undertook many elaborate experiments with the view of throwing additional light on the awful malady which it would be out of place to recapitulate here. Suffice it to say that they calculated that it would take 35,000,000 of trichinæ to equal the weight of one drachm, and that an effectual remedy was at length discovered by the administration to adults of a dose consisting of fourteen grains of hydrosulphide of potash along with an equal weight of vegetable substance, such as boiled carrot, parsnip, or potato. The origin of the disease was also traced to musty bread, on which the contaminated pigs had fed, in which an insect named the trichinosaurus had deposited its eggs.

Surely the public need only a warning to be on their guard against trichinatous pork.

We ask advice, but mean approbation.

Late Paris Food Items. — All the horses in private hands were taken without distinction as fast as they were required for food, and the sacrifice of property under this necessary edict was terrible. In at least one instance a splendid pair of carriage-horses, which cost only a few months since $1,000, were sent to the abattoirs, the proprietor receiving just $240 for them; and it is said that a splendid English horse, which cost more than five thousand dollars, was taken at the same rate. The Jardin des Plantes and the Jardin d'Acclimatation are empty. The animals have all been killed, and sold at fancy prices. Two young elephants were sold at 27,000 francs to a butcher, who has made a specialty of such game. The skin was at once sold for 4,000 francs; the feet, trunk, and other parts sold enormously dear. The kangaroos and deer of all kinds, cassowary, wild geese, ducks, pheasants, etc., all passed away long since. The Parisians have had the opportunity of tasting bear-hams, camel-hump, seal-flesh, eagle, parrot, and I know not how many other strange birds and beasts. "Camel eats like veal," says one, "seal like lamb, and bear like pig." "Why do you not eat monkey?" says another, "for monkeys imitate everything."

The Food of Armies. — The Germans appear to be a more hardy race than their opponents. They can eat black bread, the issue of which had to be prohibited among the French prisoners on account of their inability to digest it. We may also state that the Germans have practically managed to solve for themselves the difficult problem of an economical and compressed ration for field purposes. Their soldiers, on several occasions during forced marches, consumed a diet composed of mixed peas and meat — a highly nitrogenous but not very digestible compound. The Rhine wines were always consumed where they could be procured, and we do not hear of a rum or spirit ration being issued, as in our army.

CONSUMPTION.

On the Methods of Examining Lungs.

BY CARL BOTH.

TO a person of experience, observation, and practised eye, it would not be difficult to select, even from the multitudes as they throng the streets, those who suffer severely from chronic lung diseases. In such cases the head hangs forward, the scapulæ or shoulder-blades stand apart and outward like a pair of wings, the front of the chest is sunk, downward and inward, and the whole frame presents to the mind a complete and perfect picture of premature decline.

But as easy as it is to discover a severe lung affection, it is just as difficult, on the other hand, to discover the same thing in its incipient stages. And just here lies the great object of the specialist, it being comparatively easy to correct all lung difficulties in their earliest stages, while those which exhibit the symptoms above mentioned have passed beyond the reach of curative processes, and therefore in such cases there is no need for a physician except to relieve urgent and troublesome symptoms, and to save from a painful and tortuous death by suffocation. To discover and to trace the various possible injuries of the lungs, we employ the organ of hearing, the ear. We have previously learned that the mode of examining the lungs known as *percussion of the chest*, was first discovered by Auenbrugger. Physicians, as usual, however, paid no attention to it, until brought into notice by Corvisart. This discovery consists in ascertaining by a quick stroke upon a fixed body on the chest, its resonance, or rather its sonority, and thereby determining the condition of lung as to *its containing air, or its solidity*. If in the former condition, the sound produced is hollow, like that from an empty barrel; if in the latter, it is like that produced from the thigh or solid muscle of a fleshy person. For this purpose physicians use a little flat circular body called a plessimeter, made of hard rubber or ivory, and a hammer, on the end of which is a piece of soft rubber, to lessen the noise of the stroke upon the plessimeter. An experienced examiner, however, always uses the forefinger of his left hand as a plessimeter, and the middle finger of his right hand as a hammer. The human finger lies more exactly upon, and fits better between the ribs than any artificial plessimeter, and the stroke of one finger upon the other not only gives a purer, but by far a more exact and reliable note than the hammer.

The proper and efficient use of the fingers for this purpose is, however, difficult, and for many physicians absolutely impossible, and hence the very general use of the hammer and plessimeter. The notes or tones given out from the cavities of the body, are not alike in any part. The most hollow notes should come from under the clavicles or collar-bones of the chest, and from under the scapulæ or shoulder-blades upon the back, and the dullest notes should be given out when struck upon the liver. The least induration, or escape of liquid into the lung tissue, changes the tone, and thus we are enabled

to ascertain with absolute certainty whether or not the lungs have become infiltrated. It, however, requires a very acute ear, and great experience, to distinguish the small lesions, as every one knows who has practised the art of percussion. The less the exudation in any given case, the more slight, of course, will be the comparative difference of the note given out from that of perfect health, and hence not only the difficulty of distinguishing it, but also the vast and increased importance of its early detection with a view to cure.

The next most important discovery in this direction was made by Lænnec, and is called *Auscultation of the Chest*. This consists in simply putting the ear closely upon the naked chest, and listening to the noise which the air produces by inspiration and expiration. The hair fibres of the bronchial epithelium, as previously stated, all move, and with their ends standing or pointing towards the mouth, consequently the air strikes against and passes through these fine hairs, thereby making a noise somewhat like, or resembling that of a light breeze as it strikes against and passes through a corn-field; while in expiration the air passes out in the same direction with, and over the hair fibres, and consequently does not make any noise whatever during health. But when there is the least injury or exudation of blood-globules into the tissues, the action of the hair fibres is lessened, and the air under such conditions becomes audible in expiration. A description of the different *noises*, from the almost inaudible, to the loud and rattling that can be heard in every part of the room, cannot be given, but must be heard, and by experience and comparison learned, to be understood. The difference in acuteness in the sense of hearing of different persons is well known. One person can distinguish the variation of a sixty-fourth of a diatonic, or rythmical note, while another is not capable of distinguishing the variations of half a note, and this is as true of physicians as of others; and hence the art of auscultation is very easy for one, while for another it is simply impossible, although the learning of both may be equal. It is just as difficult and impossible for some physicians to learn to examine the chest correctly, as it is for others to learn to operate elegantly in surgery. With a view to lessen the difficulty in question, instruments were invented called stethoscopes. They consist of a wooden tube, or of a complication of wood, brass, india-rubber, etc., and are constructed for one or for both ears. It is, however, well known that a sound or noise cannot be made louder or stronger by distance, but, on the contrary, that its volume is lessened by each inch of space through which it passes. Therefore it is not difficult to comprehend that the use of the stethoscope is not only useless as a means of examining the lungs, but that in reality it mostly serves to impress the patient with the idea that the respective physician who makes the examination understands what he is about. A stethoscope is only useful for the auscultation of the heart; for by lengthening the distance through which the sound must pass to reach the ear, the noise produced by respiration is lessened, and consequently not so distinctly heard, while the beat of the heart, for this reason, becomes more distinctly audible. No physician who really comprehends

what he hears, and what there is to hear, will ever use a stethoscope for examining the lungs, except in cases where the untidiness of the patient makes it necessary. And the simple fact may be here stated, that the *less* a physician understands what he hears, or what there is to hear, the longer will be his instrument. The double stethoscope, as used in this country, is almost two feet long, and if placed on both ears, with the vacant face and empty head of some self-complacent and dignified looking nobody appearing in the middle, we are forcibly reminded of a picture, to mention which might be regarded as unpardonable.

There are several other but less important modes of ascertaining lung difficulties, one of which is, by means of the vibrations of the chest while speaking. The more solid the lung is, the stronger will be the vibrations. Another method employed, is the aspect of the frame of the chest. The thermometer, and the variations in the beatings of the pulse, are two important means of confirming certain pathological conditions; but percussion and auscultation are the two modes which rank first of all others. An instrument called a spirometer is often used for examining lungs, the purpose of which is to measure the amount of air contained in the chest. For the diagnosis of diseases of the lungs, this instrument is absolutely worthless, the amount of air in the lungs of any two persons never being the same. It will be found to vary as much as the strength of their muscles, although they may look equally strong. Charlatans are the only parties who use this instrument upon their victims. A person who fully understands how to examine the lungs, and comprehends the conditions indicated by the various sounds to which he has listened, in making an examination, is able immediately to draw upon paper the pathological condition of them, or otherwise he is incompetent. But a diagnosis can never be complete from the lungs alone, the condition of the rest of the body being essential, to finish the picture. The condition of the abdominal glands, and of the nervous system, in any case, are as important as the condition of the lungs. To ascertain the first, percussion of the abdomen and the chemical, or spectral analysis of the excreta, are employed. To ascertain the latter, the history and circumstances of the patient, in connection with observation on the part of the physician, are the only means by which a correct final conclusion is possible.

The absolute necessity of a correct diagnosis in treating disease is not sufficiently understood by the public, and therefore is not regarded as of sufficient importance, on the part of their respective physicians in general, to make themselves masters of it. But any physician who undertakes to treat, or to prescribe anything for a patient, without a *complete* diagnosis, is, to say the least, doing the same thing, and acting on the same principle, as the most contemptible quack. It should be the fixed purpose of every patient, not to allow any physician whatever to prescribe for him, unless he is abundantly able to satisfy him by clear and comprehensive explanations in reference to the difficulty from which he is suffering. There exists no pathological condition in man, in animals, in the air,

or anywhere in the universe, which is incomprehensible, or which requires the least secrecy. Whatever is unknown to science is unknown, and does not require to be covered by the dignity of ignorance.

THE POT ON THE FIRE.—There is one mode of preparing food in general use in many parts of the Continent which we should do very well more generally to adopt; that is, "gentle simmering." In every or almost every French household there is the *pot au feu*. This permament "pot on the fire," after the manner of the old-fashioned "digester," occupies a quiet little corner of the stove or fireplace. It can hardly be said to boil, but it simmers on gently, very gently, for hours. There it is the receptacle of many a little bone, whether the trimmings of poultry or butchers' meat. It matters not, every little stray fragment of wholesome meat finds its way there. A bit of liver is considered an immense improvement; and any vegetables that happen to be about add to its pleasant flavor, whether the tops of celery, Jerusalem artichokes — which, par excellence, make it delicious — or otherwise carrots, turnips, leeks, etc. But supposing it were to be made altogether of fresh materials — which, indeed, in France it rarely is — this would be the proper recipe: Put a gallon of water into a pot; put into this either three or four pounds of shin of beef, or any similar thing. Add to this an onion or two, or some leeks, carrot, or other vegetable, three or four teaspoonfuls of salt, one of black pepper, three cloves. Give it one boil up; skim carefully. Now cover the pot closely, and let it cook gently, for four hours at the least. About every hour throw a wineglassful of cold water into it, to make it clear. Taste: it may require a little more salt or pepper, according to taste. Pour this soup over toasted crusts of bread. Both soup and meat will be found delicious. The whole secret of this lies in the gentle simmering in a covered vessel, whereby the flavor is wholly preserved, and nothing is lost. A bullock's head so cooked is excellent.

OIL OF EGGS.—An oil is in use in South Russia, which has the merit of simplicity, being made of the yolks of hens' eggs, which are first boiled hard and the yolks removed, cooked and placed over the fire. Here they are carefully stirred until the whole substance is on the point of catching fire, when the oil separates and may be poured off. The yolk will yield nearly two teaspoonfuls of oil. With all our enormous consumption of eggs it is extraordinary how little we know about them, and of the manifold uses to which they may be put.

THE SIEGE OF PARIS will have resulted in at least one good thing, viz., the turning scientific attention towards the utilization of substances for food. We learn that Prof. M. Decaisne has brought forward a plan for the rapid forcing of cabbages, radishes, and other vegetables, which are to be sown in highly manured land, kept for a fortnight, and used stem and root. Bones, too, are much more utilized than before by the extraction of the osseine by the action of acid, and this is made up into various palatable and nutritious substitutes for butter and jelly.

AMERICAN MEDICAL ASSOCIATION.—The next meeting of this Association is to be held in San Francisco, California. It bears, or purports to bear, the same relation to the different local medical organizations that Congress bears to the several States, and consequently its members, as delegates from the local organizations, should have a clear and defined understanding of the views of their respective constituencies. In this way, and in this way only, can the Association be made a truly representative body, and its proceeding rendered binding upon the medical profession.

STATE OF THE MIND DURING SLEEP.

BEFORE proceeding to discuss the very difficult subject of "the state of the mind during sleep," we may advantageously introduce a few observations on some of the most remarkable physical phenomena that accompany the sleeping condition. The immediate antecedents of sleep — as languor, a sensation of weight in the upper eyelids, partial temporary relaxation of certain muscles, as shown by the nodding and dropping of the head upon the breast, comparative obtuseness to external impressions, yawning, etc.— call for no very special remark. The order in which the muscles lose their power is, however, deserving of a passing notice. The muscles which move the arms and legs usually become relaxed before those which support the head; and the latter before those which maintain the body in an erect position. There are, however, many exceptions to this rule, as may be seen in church on a hot Sunday, when some of the congregation are almost certain to be seen with their chins quietly resting on their chests, but yet tightly grasping their prayer-books. Moreover, in relation to the special senses, that of sight is first lost, the closing of the eyelids setting up a barrier between the retina and the external world; but, independently of the eyelids — if they have been removed by the surgeon, or cannot be closed through disease — the sight is still the first sense whose function is abolished. Some animals, as the hare, do not shut their eyes when asleep; and in cases of somnambulism the eyes remain open, although the sense of sight is temporarily lost. The other senses are not altogether abolished; but their acuteness is much lessened. Taste is the first to disappear, and then smell; hearing follows; and touch is the most persistent of the senses. So, conversely, a person is most easily awakened by tactual expressions, next in order by sounds, and then by smell.

Although the operations of the senses are suspended during sleep, the animal functions — as respiration, circulation, digestion, secretion, etc. — continue their regular action. With the brain and spinal cord, however, the case is different from that of the lungs, heart, etc.; for, while some parts of the central nervous system retain the property of receiving impressions or developing ideas, others have their actions arrested, diminished, increased, or perverted. To use the almost epigrammatic words of Marshall Hall, "the spinal cord never sleeps."

"The predominance which one or two mental qualities apparently assume is not due to any absolute exaggeration of power, but to the suspension of the action of other faculties which, when we are not asleep, exercise a governing or modifying influence. Thus, for instance, as regards the imagination — the faculty of all others which appears to be most increased — we find, when we carefully study its manifestations in our own persons, that although there is often great brilliancy in its vagaries, when uncontrolled as it is by the judgment, the pictures which it paints upon our minds are usually incongruous and silly in the extreme. Even though the train of ideas excited by this faculty when we are asleep be rational and coherent, we are fully conscious on awaking that we are capable of doing much better, by intentionally setting the brain in action, and governing it by our will and judgment.

"Owing to the fact that these two faculties of the mind are incapable of acting normally during sleep, the imagination is left absolutely without controlling influence; indeed, we are often cognizant, in those dreams which take place when we are half-awake, of an inability to direct it. The impressions which it makes upon the mind are, therefore, intense, but of very little durability. Many stories are told of its power — how problems have been worked out, poetry and music composed, and great undertakings planned; but, if we could get at the truth, we should probably find that the imagination of sleep had very little to do with

the operations mentioned. Indeed, it is doubtful if the mind of a sleeping person can originate ideas" (see p. 64, *op. cit.*).

The cases we shall shortly quote, when carefully analyzed, tend to show the correctness of the view propounded by Locke, in his celebrated "Essay concerning Human understanding," that the ideas in the mind during sleep are frequently ideas that have previously occurred in the waking state, often strangely and incongruously put together.

That the mind is often highly active during sleep is a fact which cannot be called in question. Most of our readers are, doubtless, acquainted with the well-known stories of Tartini and the "Devil's Sonata;" of Coleridge's account of the composition of the fragment, "Kubla Khan;" and of the dreams recorded by De Quincey, in "The Confessions of an English Opium-eater."

The marvellous power of opium, even when taken in small doses, in arousing the imagination, is so remarkably illustrated by the following case, which fell under the observation of Dr. Forbes Winslow, that we venture to record it without material abbreviation: — A feeble, sensitive lady, suffering from a painful disease, for which she was recommended to take an anodyne, writes as follows to this eminent psychologist regarding the effect of three or four doses of very minute quantities (one-sixteenth of a grain) of hydrochlorate of morphia upon her imaginative faculties. (It is almost needless to observe that morphia is one of the alkaloids occurring in crude or natural opium.)

"After taking a few doses of morphia, I felt a sensation of extreme quiet and wish for repose; and, on closing my eyes, visions, if I may so call them, were constantly before me, and as constantly changing their aspect: scenes from foreign lands, lovely landscapes, with tall, magnificent trees, covered with drooping foliage, which was blown gently against me as I walked along: then, in an instant, I was in a besieged city, filled with armed men: I was carrying an infant, which was snatched from me by a soldier, and killed on the spot: a Turk was standing by, with a scimitar in his hand, which I seized, and attacking the man who had killed the child, I fought most furiously with him, and killed him: then I was surrounded, made prisoner, carried before a judge, and accused of the deed; but I pleaded my own cause with such a burst of eloquence (which, by the by, I am quite incapable of in my right mind) that judge, jury, and hearers acquitted me at once. Again, I was in an Eastern city, visiting an Oriental lady, who entertained me most charmingly: we sat together on rich ottomans, and were regaled with supper and confectionery: then came soft sounds of music at a distance, while fountains were playing, and birds singing, and girls danced before us, every movement being accompanied with the tinkling of silver bells attached to their feet. But all this suddenly changed, and I was entertaining the Oriental lady in my own house; and, in order to please her delicate taste, I had everything prepared, as nearly as possible, after the fashion with which she had so enchanted me. She, however, to my no small surprise, asked for wine, and took, not one, two, or three glasses, but drank freely, until at last I became terrified that she would have to be carried away intoxicated. While considering what course I had better adopt, several English officers came in, and she at once asked them to drink with her, which so shocked my sense of propriety that the scene changed, and I was in darkness. Then I felt that I was formed of granite, and immovable: suddenly a change came again over me, and I found that I consisted of delicate and fragile basket-work. Then I became a *danseuse*, delighting an audience and myself by movements which seemed barely to touch the earth. Presently, beautiful sights came before me: treasures from the depths of the sea, gems of the brightest hues, gorgeous shells, coral of the richest colors, sparkling with drops of water, and hung with lovely sea-weed. My eager glances could not take in half the

beautiful objects that passed before me during the incessant changes the vision underwent. Now I was gazing upon antique brooches and rings from buried cities; now upon a series of Egyptian vases; now upon sculptured woodwork, blackened by time; and, lastly, I was buried beneath forests of tall trees, such as I had read of but never seen. The sights that pleased me most I had power, to a certain extent, to prolong, and those that displeased me I could occasionally set aside; and I awoke myself to full consciousness once or twice, while under the influence of the morphia, by an angry exclamation that I would not have it. I did not once lose my personal identity."

The memory is exercised to a great extent during sleep, and knowledge acquired long ago, and totally irrevocable in the waking state, sometimes crops up most marvellously in dreams. Numerous cases are on record of persons, when dreaming, speaking words or sentences of a language that they had learnt, or perhaps only heard, in childhood, and had in their waking state utterly forgotten.

The following remarks upon the judgment during sleep are well worthy of attention. Dr. Hammond observes, in reference to this subject, that "the judgment is frequently exercised when we are asleep, but almost invariably in a perverted manner; in fact, we scarcely ever estimate the events or circumstances which appear to transpire in our dreams at their real value, and very rarely form correct conceptions of right and wrong. High-minded and honorable men do not scruple during sleep to sanction the most atrocious acts, or regard with complacence ideas which, in their waking moments, fill them with horror. Delicate and refined women will coolly enter upon a career of crime; and the minds of hardened villains are filled with the most elevated and noble sentiments. The deeds which we imagine we perform in our sleep are generally inadequate to, or in excess of, what the apparent occasion requires; and we lose so entirely the ideas of probability and possibility, that no preposterous vision appears otherwise than as perfectly natural and correct. Thus, a physician dreamed that he had been transformed into a monolith, which stood grandly and alone in the vast desert of the Sahara, and had stood so for ages, while generation after generation wasted and melted away around him; although unconscious of having organs of sense, this column of granite saw the mountains growing bald with age, the forests drooping with decay, and the moss and ivy creeping around its crumbling base."

During sleep, says Dr. Hammond, the power of bringing the judgment into action is suspended. "We do not actually lose the power of arriving at a decision; but we cannot exert the faculty of judgment in accordance with the principles of truth and of correct reasoning. An opinion may, therefore, be formed during sleep, but it is more likely to be wrong than right; and no effort that we can make will enable us to distinguish the false from the true, or to discriminate between the possible and the impossible. That faculty of the mind — the judgment — which, when we are awake, is pre-eminently our guide, can no longer direct us aright. The stores of experience go for naught, and the mind accepts as truth whatever preposterous thought the imagination presents to it. We are not entirely rendered incapable of judging, as some authors assert; but the power to perceive the logical force of circumstances, to take them at their true value, and to eliminate error from our mental processes, is altogether arrested, and we arrive at absurd conclusions from impossible premises." But there is no doubt that at times the faculty of judgment is suspended, as regards some parts of our mental operations, during sleep; and this to such an extent, that we are like Gassendi, who, as he slept, saw and conversed with a friend, who, as he knew, had died of the plague. Then he reflected in his dream as follows: — "One cannot return from the other world: I am, doubtless, dreaming; but, if I dream, where am I? — not in Paris, for I came last night to Digne!" And while argu-

ing with himself as to where he was, and while looking for himself in the bed, he awoke.

A case in which the judgment was even more at fault than in the above instance recently came under Dr. Hammond's personal knowledge: — Mrs. C. dreamed that she was Savonarola, and that she was preaching to a vast assembly in Florence. Among the audience was a lady whom she at once recognized to be her own self. As Savonarola, she was delighted at this discovery; for she reflected that she was well acquainted with all Mrs. C.'s peculiarities and faults of character, and would therefore be enabled to give special emphasis to them in the sermon. She did this so very effectively that Mrs. C. burst into a torrent of tears, and with the emotion thus excited the lady awoke. It was some time before she was able to disentangle her mixed-up individualities. When she became fully awake, she perceived that the arguments she had employed to bring about the conversion of herself were puerile in the extreme, and were directed against characteristics which formed no part of her mental organization, and against offences which she had not committed.

Macario, whose work on "Sleep and Dreams" is well worthy of perusal, explains the preposterous nature of such dreams as these in the following way: — "It is astonishing," he observes, "that all these fantastical and impossible visions seem to us quite natural, and excite no astonishment. This is because the judgment and reflection, having temporarily abdicated, no longer control the imagination nor co-ordinate the thoughts, which rush tumultuously through the head of the sleeper, controlled only by the power of association.

Why the judgment is not properly exercised during sleep we do not know, and, in all probability, we shall never know with certainty. Dr. Wilson Philip and other physiologists have suggested explanations, all of which are unsatisfactory. Dr. Hammond suggests that the cause probably lies in some alteration in the circulation of the blood in that part of the brain which presides over the judgment. But where is this part localized?

Dr. Hammond sums up his very interesting observations on "Sleep and its Derangements" in the following paragraphs: —

"During sleep the three great divisions of the mind are differently affected.

"1. Feeling, embracing sensation and emotion, is suspended, so far as the first is concerned, but is in full action as regards the second. We do not see, hear, smell, taste, or enjoy the sense of touch in sleep, although the brain may be aroused into activity, and we may awake through the excitations conveyed to it by the special senses. The emotions have full play, unrestrained by the will, and governed only by the imagination.

"2. The Will, or Volition, is entirely suspended.

"3. The Thought, or Intellect, is variously affected in its different powers. The imagination is active, and the memory may be exercised to a great extent; but the judgment, perception, conception, abstraction, and reason are weakened, and sometimes altogether lost."

INSECT APPETITE. — The man who wished he had a throat a mile long, and a palate all the way, might envy the feats performed in the world of insignificance. Some insects are endowed with an appetite so keen, and a digestion so rapid, that they eat incessantly throughout the whole of their lives. They begin as soon as they are born, and go steadily on till they die. Their existence is a feast, without a change of plates, or a pause between the courses. Morning, noon, and night, their mouths are full, and an endless procession of favorite food gratifies the unwearied palate. They know not the names of meals. Breakfast commences with infancy, and their only after-dinner nap is a passage to another state of existence.

CLEANSING of the skin is the best way to keep off diseases of it, and of the lungs and kidneys.

THE HONEY TRADE OF THE UNITED STATES.

HONEY which, twenty-five years ago, formed quite an insignificant article of trade in this country, is rapidly increasing year after year in domestic production; whilst the amount imported is growing smaller. While less is used for pharmaceutal purposes, it is rapidly increasing in domestic use. It is also used largely by confectioners, and is an ingredient of many of the fancy beers which have recently come in vogue. Some dealers maintain that the honey which is the product of a cold climate is vastly superior to that of warmer latitudes, which seems almost a contradiction to nature, as Southern lands teem with flowers far excelling as a base of supplies to the bees. One sample that the writer saw from Canada excelled all others in whiteness, clearness and density. Samples from New York, Minnesota, Vermont and New Hampshire, ranked next in order. In England a specimen of rose-colored honey was recently presented by Messrs. Fortnum & Mason to the Food Department of the South Kensington Museum, which was of great beauty and delicacy. The comb was virgin, the wax almost white, the honey limpid, pure, and of the color of pale red currant jelly. The secret of its production is not revealed, except that it is the result of artificial feeding. The *Gardeners' Chronicle* remarks that honey from white clover has a greenish-white hue, that from heather a rich golden yellow, and no doubt other colors might be observed according as certain flowers are in particular abundance. It is even possible that feeding the bees upon currant or raspberry jelly or jam would answer the purpose equally well. But it is clear that this step in the refinement of honey being reached, we shall not stop here. With the help of the chemist, the bee-keeper will be able to turn out, in a few weeks, to order, honey of any hue, blue, pea-green, orange, or apricot-colored, or even,—by a little ingenius manipulation of the present system of hives, which will allow of any part of the comb being shut off or made accessible to the bees at pleasure,— a parti-colored honey, arranged in artistic patterns and devices. The only way to obtain pure honey is to buy it in the comb, as nearly all the strained honey sold in the market bears unmistakable evidence of adulteration; this is, however, well-known and easily discovered, the adulteration being mostly sugar and occasionally a little starch, to give it a whitish appearance, and is at least *harmless;* which cannot be said of all the adulterations now in use. Out of ten samples purchased of different dealers, eight of them gave plain evidence of having been tampered with, the remaining two being samples from Cuba, direct from the custom-house.

"In 1860 the total product of honey of the United States, reported, was 23,366,357 pounds." "In the winter of 1868–69 the Department of Agriculture sent out circulars to known apiarians in most of the states, and received returns from 489 counties in 32 states. The aggregate number of hives reported was 722,385." "Estimating for counties not reporting, and making due allowance for the fact that many of the counties reporting were giving especial attention to bee culture, 2,000,000 of hives were deemed as low a figure as the returns would warrant. Allowing fifteen pounds of surplus honey to the hive (about two-thirds of the average reported), the total product in 1868 would be 30,000,000 pounds, which, at an average valuation of 22½ cents per pound, would give $6,750,000." "In 1868 the quantity of honey imported was 212,176 gallons; value, $117,172; of which 90,452 gallons, value $50,569, were re-exported. A very small quantity of domestic honey was exported the same year. These figures show conclusively that an immense trade in honey has been built up in this country and is constantly increasing, which will eventually super-

cede all necessity of the importation of any from the West Indies." A small township in Minnesota reports 262 hives; from these hives 2,826 pounds of surplus honey was taken in the season of 1869." When we consider that the cost of production is merely nominal, it will be seen that it pays to keep bees.—*Am. Jour. Pharm.*

OPEN DOORS.

MOST of our houses — or at least a large proportion of them — are heated by a furnace, even if all the warmth is not derived from one. Open fireplaces, it seems to us, are becoming rarer and more rare, and with them disappears a most efficient means of ventilation. We will not stop here to lament this as a great loss to us in a social point of view, this depriving the family of the *focus* to which its various members may come, — the hearthstone, so dear to all who have had a real one, — though we believe it to be a great loss; but we will urge it as a reason for throwing open more freely the doors of communication between entries and rooms. Since furnaces have been so generally introduced, entries and passages can be, and are, kept much warmer than was possible before,—quite warm enough, if not indeed too warm, for health, — and there need no longer be the risk of unduly lowering the temperature of the rooms in which we live, by leaving the door open behind us. Besides, windows shut closer, and, as towns increase in size, the outer cold has less effect upon in-door temperature; and, what is of far greater moment, ventilation, in too many modern houses, must be secured through the entries, or not at all. Fresh air, it is true, is poured into the rooms from the furnace, but egress for that which is vitiated is not provided, and it must pour out through cracks, or remain. Of course, if we could wait, it would pour out. Fresh hot air coming in would gradually completely purify the room, which would attain a temperature of over 100° F. But we cannot stand it: so we shut the register, and put an end to ventilation and temporary discomfort together. Very few houses, however, have means for throwing as much hot air into their entries as into the rooms, so that not only are the latter filled with vitiated air, but actually, in spite of all the modern improvements, the entries grow cold; more coal is thrown on the furnace, its upper door is shut, and very little is effected.

Now, if we would only accustom ourselves to open doors, we would certainly have better ventilation in the rooms, and warmer entries, while both rooms and entries might be kept at a temperature of 68 degrees with much less trouble than is now expended in bringing rooms "up to seventy degrees."

Where there are children, it is, we think, of great importance that rooms and entries should be of the same temperature, for certainly a large proportion of the chest and bowel affections of the young can be traced among certain classes to an exposure to a change in temperature, especially where the little ones are in the habit of passing from overwarmed rooms into somewhat underwarmed entries.

There is no need to dilate on the necessity of ventilation to young and old; but even where stoves are used, and a certain ventilation is thus afforded, our remarks hold true, for there is no doubt that all ordinary modes of burning anthracite coal pour into our rooms so much of the inodorous, tasteless, poisonous carbonic oxide, that we can hardly have too much air with which to dilute it.

So we put in a plea that instruction be given to our young folks somewhat different from that which their forefathers received. Teach them by all means to be obedient and docile, but forgive them if doors be left ajar; nay, more, — teach them to leave them open.

— *Medical Times.*

HYDRATE OF CHLORAL.

LIKE other powerful drugs, hydrate of chloral is an edged tool which belongs only in the hands of a skilled workman; properly used it may be productive of good, but in the hands of those unaccustomed to watch the action of medicines it will do much harm.

A recent writer on this subject says:

"The attention of the public has been called lately by some of our most respectable journals — newspapers, I mean — to the 'free use of the new narcotic or anæsthetic, chloral.' In them the community is warned against the use of the article on account of its fascinating and dangerous properties.

"The warning is by no means untimely, for I have reason to believe that a great many persons have been and are using it on their own responsibility, without competent medical advice, as if it were a harmless luxury. Indeed, the American people are strangely fond of dosing, and seem willing to experiment upon themselves by taking drugs whose names they cannot write or pronounce correctly, whose properties they are ignorant of, and in quantities that no intelligent physician would dare to prescribe.

"The hydrate of chloral, commonly but incorrectly called chloral, is an excellent illustration of this American recklessness. It is scarcely more than eighteen months since attention was called to it by Liebreich, of Berlin. Physiologists and physicians have not yet completely solved the problem of its action and value. But, notwithstanding its novelty, our people, unwilling to wait for the verdict of physicians with regard to it, and ignorant of the precautions necessary in the use of unknown drugs, have been drinking it, in some instances, like a beverage. The result is what might have been anticipated from such careless experimentation. Some have been benefited, some frightened, and some injured by it. A little wholesome alarm with regard to it would do the public good, or at least save the public from a certain amount of harm. No unskilled person should meddle with it. It is capable of devitalizing the blood, and of producing convulsions and death."

Another writer says:

"The hydrate of chloral, about which so much has been written during the past year, has now reached the stage of a quack medicine, and, in the hands of designing or ignorant people, is likely to occasion much mischief. It is sold in fluid form as an anodyne, mixed with gum or sugar water, glycerine, or some tincture; and as the strength of the preparation is not given, and it is liable to undergo spontaneous decomposition, the patient can never tell how much of a dose he is taking. A bottle of chloral, put up in the usual style of a popular medicine, which was sent to us six months ago for examination, has entirely decomposed; and it would be dangerous to use it, as the nature of the products of decomposition are not well understood. We must utter a note of warning that it is never safe to take the hydrate of chloral unless freshly prepared, and upon prescription of a competent physician."

A writer on the therapeutical value of this drug has the following:

"If we review the pages of the medical journals for the therapeutical effects of hydrate of chloral, we shall find many cases where its action has been attended with marvellous results. There does seem not a little danger of its being erected into a kind of panacea for all the ills that flesh is heir to, and hence its true worth and fame will suffer from a too indiscriminate use, and from the administration of some of the impure compounds which are being supplied.

"We find it employed in cases of 'maniacal paroxysms,' 'delirium tremens,' 'traumatic tetanus," chorea, diarrhœa, whooping cough, convulsions (epileptic or otherwise), with more or less benefit; it allays vomiting, and prevents sea-sickness; in puerperal mania it is well reported of;

in fact, as a sleep compeller, it is, in a very large number of cases, unrivalled; for while in power opium alone can be compared with it, there is this superiority to opium, that its use entails no unpleasant after-symptoms, no headache, no nausea, no anorexia, no constipation, whilst the sleep it produces is gentle, calm, and continued; at least, this is the general rule, but, of course, there are exceptions, and medical men complain that its administration is attended with uncertain results, and that its quality is not so good as it was when first introduced; but even with true hydrate of chloral we must expect to find exceptional cases, so long as human beings differ so greatly in temperament, constitution, and sensibility to the action of medicine.

"That hydrate of chloral ought to be perfectly pure when used in medicine is unquestionable; the substitution of alcoholate is quite sufficient to produce most of the ill effects attributed to chloral. In fact, instead of being a hypnotic, it has a tendency to produce mental excitement, as ordinary stimulants."

The following conclusions on the use of hydrate of chloral in insanity have been reached by another writer:

"It is more reliable in all classes of cases of wakefulness than any other agent known.

"When given for an indefinite length of time, in extreme cases of acute mania, to the extent of producing quiet or sleep, it has no perceptible effect in allaying the mania; but when the medicine is suspended the mania is as violent as before.

"In acute mania, the effect of healthy sleep is not demonstrable after sleeping from this medicine; as the general symptoms of maniacal exhaustion proceed apparently with the same rapidity as when the mania is allowed to continue, even with prolonged loss of sleep.

"In sub-acute mania, melancholia, and other mild forms of wakefulness, great benefit is undoubtedly derived, and may be confidently expected.

"The action of the chloral depending upon an alkaline condition of the blood for its change into chloroform — upon which change the specific effects are based — it may be suspected, in all cases of failure, that the blood is not alkaline; but may be in a morbid state, and either neutral or acid. But alkaline correctives should not be resorted to while the system is supposed to contain any large quantity of chloral recently administered, else dangerous results may follow."

EXERCISE.

WE clip the following from a little work entitled EXERCISE AS A MEANS OF HEALTH, by Prof. F. C. Welch, of Yale College Gymnasium.

Gymnasiums and Physical Culture gave to Greece the finest race of men the world ever saw. Give us good public gymnasiums, and it would be a dead shot to our houses of reformation, our institutions for the insane, and our thousand and one quackeries in medicine and benevolence. It would cost one-half less to furnish and sustain public gymnasiums than it would for taking care of culprits made so for want of such institutions.

Society will never be properly constituted until it be constituted on the basis of physiological law.

Gymnastics are valuable to all persons, but especially to students, clerks, and sedentary artisans, and still more particularly to those who, in addition to sedentary habits, perform inexhaustible intellectual labor. Gymnastic culture makes whole men. A healthy soul can live only in a healthy body. Plato calls him a cripple who cultivates his mind alone, suffering his body to languish through inactivity and sloth.

Gymnastics produce cheerfulness, independence, and presence of mind. They regulate the fancy and imagination, and diminish a predisposition to

moral faults which undermine health and bodily purity.

Exercise is as essential as breathing itself. Without it, there can be no healthy and beautiful growth. No person can enjoy health, nor attain any degree of personal beauty, without more or less active daily exertion.

Exercise is a necessity; it prolongs life, and greatly improves living; it better fits us for our duties; without it, we do not more than half live. He only, who exercises sufficiently, can know the joy of living well, of good health, good appetite, good digestion, refreshing sleep. It causes the blood to circulate quickly, freely and equally, and will drive away the blues. It increases respiration, thus bringing a larger quantity of that "elixir of life," oxygen, to purify and vitalize the blood. It rounds and hardens the muscles, and educates them into ever ready, faithful, and efficient servants of the will. It limbers the joints, and strengthens every part of the system. It invigorates the mind, and renders it more active and efficient in all its operations; in short, it is one of the great natural agents which will enable man to reach that state of physical, mental and moral perfection for which he was designed by his Creator.

Sooner or later, we must think about this subject. Is not the body worth all the care and labor we can bestow upon it? Other things being equal, the greater the capacity, the strength, the power, the endurance of the body, the greater will be the mind in these respects. Is it not a duty devolving upon the old and young of both sexes, to take every possible means to preserve and improve these bodies of infinite perfection, of such varieties of power, of such capacities of enjoyment?

Proper and systematic physical culture refines, elevates, and ennobles, adds to our courage, zeal, and health, and thereby to our happiness.

The activity of the muscles is also highly conducive to the well-being of many other important functions. The blood is assisted in its course; accumulation in the internal organs is prevented; the important processes of digestion, respiration, accretion, absorption and nutrition are promoted, and the health of the whole body immediately influenced. The mind is greatly exhilarated.

Sick-rooms: Decision and Quietness.—Consult your patient's wants, but consult him as little as possible. Your decision need not be very obvious and positive; you will be most decisive if no one suspects that you are so at all. It is the triumph of supremacy to become unconsciously supreme. Nowhere is this decision more blessed than in a sick-room. Where it exists in its genuineness, the sufferer is never contradicted, never coerced; all little victories are assumed. The decisive nurse is never peremptory, never loud. She is distinct, it is true—there is nothing more aggravating to a sick person than a whisper—but she is not loud. Though quiet, however, she never walks tip-toe; she never makes gestures; all is open and above-board. She knows no diplomacy or *finesse*, and of course her shoes never creak. Her touch is steady and encouraging. She does not potter. She never looks at you sideways. You never catch her watching. She never slams the door, of course, but she never shuts it slowly, as if she were cracking a nut in the hinge. She never talks behind it. She never peeps. She pokes the fire skilfully, with firm judicious penetration. She caresses one kind of patient with genuine sympathy; she talks to another as if he were well. She is never in a hurry. She is worth her weight in gold, and has a healthy prejudice against physic, which, however, she knows at the right time how to conceal.

Metals in the Sun.—Angström of Upsala finds thirteen metals in the sun in addition to hydrogen, and he is led to believe that the sun has few elements which are not found on our earth.

Loss and Unjust Gain.—Prefer loss before unjust gain; for that brings grief but once, this forever.

Sanitary Law. — The great body of the people should have a knowledge of real sanitary wants, and ability to appreciate and sustain sanitary laws framed for their benefit. No great scientific preparation is required for this purpose. Children, even in the nursery, and still more easily when acquiring the elements of learning, might soon gather up in conversation with their seniors, and without formal inculcation, a knowledge of the composition of the atmosphere and some of the properties of the gases of which it consists, and particularly the uses of oxygen in respiration. They might be told of nitrogen and nitrogenous compounds in connection with animal food and animal decay, in contrast with starch and sugar and gum. An acquaintance with elementary anatomy and physiology might be begun by a little girl when watching the cook or her mother eviscerating a chicken and seeing the parts spread out on a table, and also by a boy in witnessing the preparation of an ox, a sheep, or a lamb for sale by the butcher. A brief primer of anatomy and physiology would do the rest. Much could be done by the physician in his intercourse with little folks, who would be strongly impressed with anything he might say on the structure and functions of their bodies, and how their health would be benefited or injured. Children often speak correctly and fluently before they know the meaning of grammar; they might with equal readiness, by the aid of proper surroundings and conversation, gather the elements of sanitary science before they could be supposed to be ready to hear scientific lectures and witness scientific demonstrations. A very important aid in the diffusion of this so-much-needed knowledge would be found in the establishment of courses of popular lectures on physiology and hygiene. People in general are quick to learn and appreciate the meaning and value of what is said, when they find in it a constant application to themselves.

—*Medical Times.*

To help the sick is the duty of all.

Cure for Sleep-walking. — A learned professor of Florence has discovered that a copper wire, wrapped around the leg of a sleep-walker on going to bed, and left to extend to the floor, will prevent him from indulging in his ordinary pastime. He explains the result on electrical principles. We can readily imagine that a sensitive person, such as sleep-walkers are, would be kept from passing into the somnambulic condition by a *diverticulum* of that kind. Many persons, not sleep-walkers, would not sleep at all with a wire coiled about their legs. The hint, however, is a good one. It is probable that sleep-walking occurs only in very sound sleep. Anything, therefore, which tends to prevent sound sleep, militates against the somnambulic manifestations. Unusual mental or physical impressions, made on going to rest, are calculated to have that effect. A person anxious to rise early, and fearful of over-sleeping himself, will lie awake half the night. There is some relation between sleep-walking and nightmare, both as to causation and prevention. Error of digestion may produce them, as a hard bed may cure. We have no doubt the wire would be as good against one as against the other. Perhaps a tarred rope would answer the purpose. Or what if the patient were to go to bed with his boots on?

—*Pacific Med. and Surg. Jour.*

Ozone Developed by Flowers. — From Prof. Mantegazza's experiments on this subject, we have the following: The essences of mint, turpentine, cloves, lavender, bergamot, anise, juniper, lemon, fennel, nutmegs, cajeput, thyme, cherry, laurel, in contact with atmospheric oxygen in light, develop a very large quantity of ozone, equal if not superior in amount to that produced by phosphorus, by electricity, and by the decomposition of permanganate of potash. The flowers of the narcissus, hyacinth, mignonette, heliotrope, lily of the valley, etc., develop ozone in closed vessels. Flowers destitute of perfume do not develop it, and those which have but slight perfume

develop it only in small quantities. As a corollary from these facts the professor recommends the use of flowers in marshy districts and in places infected with animal emanations, as the powerful oxidizing influence of ozone may destroy them. The inhabitants of such regions should surround their houses with beds of the most odorous flowers.

AMERICAN STATUE TO HARVEY. — *Nature* announces that it is proposed to erect a statue of Harvey, the discoverer of the circulation of the blood, in the Central Park, New York, and large subscriptions have been received for that purpose. It is to be of bronze, of colossal proportions, representing "Harvey at the moment he felt convinced he had made the great discovery that has immortalized his name." Verily the American sculptors have a pleasant task before them. How does a philosopher usually look under such circumstances?

THE CASES OF ALLEGED ROBBERY BY MEANS OF CHLOROFORM. — The British *Med. Jour.* asks how persons who are mysteriously robbed can be rendered instantaneously insensible by chloroform and other anæsthetic vapors. The *Journal* says that men of science are unacquainted with instantaneous methods of producing anæsthesia, as it is well known that it is a slow process to produce insensibility by means of evaporating any known fluid from a pocket-handkerchief, even when aided by the ready and intelligent coöperation of the subject. Under these circumstances, the *Medical Journal* thinks that it is hard to suppose that thieves have acquired knowledge of a secret beyond the skill of men of science.

MORMON physicians are forbidden, under a penalty of one thousand dollars, and not less than a year's imprisonment, to prescribe any of the more powerful agents known to the medical profession, without first explaining to the patient and his friends their medical properties, and procuring the unqualified consent of all concerned.

THE human body, according to Dr. Nichols, in the *Journal of Chemistry*, contains phosphorus enough for four hundred ordinary two-cent packages of matches, but not quite sulphur enough for them. There is water enough to "drown the individual," or, rather, *another* individual.

THE late war is likely to afford some valuable statistics. Investigations are being made in order to ascertain the comparative healthiness of consumers of alcohol and total-abstainers. It has been already discovered that married soldiers in the German army are much more healthy than unmarried.

HOW TO CLEAN PAINT.— If cleanliness is, as some folks say, one of the arts, all that helps it should be made known. Doors, walls, or anything that is painted, may be cleaned with a piece of soft flannel, dipped in warm water, then wrung, and sprinkled with finely powdered French chalk. The paint on being rubbed with this will become quite clean, and will be saved from the destructive action of soap.

BLACK-LEAD PENCIL DRAWINGS, OR CHARCOAL DRAWINGS, may be fixed by a process which involves but little expense or trouble. Thus: Prepare a solution in moderate strength of bleached shell-lac in alcohol; wash over the back of the sheet of paper with this, and the drawing on the front will become fixed. In this way, as will be understood, there is no risk of smearing the lines of the drawing.

OYSTER LIQUOR UNDER THE MICROSCOPE.— Open an oyster, retain the liquor in the lower or deep shell, and, if viewed through a microscope, it will be found to contain multitudes of small oysters, covered with shells, and swimming nimbly about — one hundred and twenty of which extend but 1 inch. Besides these young oysters, the liquor contains a variety of animalcules and myriads of three distinct species of parasites. Sometimes their light represents a bluish star about the centre of the shell, which will be beautifully luminous in a dark room.

HUMAN HAIR — REAL AND FALSE.

THE dark-haired races of mankind, according to Dr. Prichard, inhabit the greater portion of the habitable globe. The black-haired Celts and Cymri were driven out by the fair-haired followers of the Norwegian sea-kings, and later by the Danes of the same type. Dr. Wynter points out, that, at the present moment, the fairest-haired inhabitants of the earth are to be found north of the parallel 48 degrees. This line cuts off England, Belgium, the whole of Northern Germany, and the greater portion of Russia. Race determines the color of the hair more than latitude or temperature; hence, brown hair has of course resulted from the admixture of the dark and light-haired races. This color is very predominant in England. Dr. Beddoes examined the hair of 726 women, and of those he found that 22 had red hair; 95, fair hair; 240, brown; 336, dark brown; and only 33 had black hair. In one case, a weight of 22,000 grains has been supported by a single hair.

We have heard of a scientific barber who always enlightened his customers by informing them that "the 'uman 'air is an 'ollow tube." He was right. Each hair is a cylindrical tube 1–350th part of an inch in diameter; and color depends upon the fluid which fills it. The coloring matter is drawn directly from the blood. Golden hair owes its brightness to an excess of sulphur and oxygen; and black, to a great deal of carbon, and little sulphur and oxygen. Gray hair is, of course, owing to an absence of the coloring matter. In albinos, the hair is perfectly white. Marie Antoinette's hair turned gray in the night preceding her execution. Dr. Wynter supposes that the blood sends some fluid among the pigment of the hair which at once changes its color. The same author remarks, that in some, though very rare instances, persons have been born with patches of white hair; and there is at present in the Museum of Natural History at Paris, a portrait of a piebald negro, in which the hair of the head presents very much the party-colored appearance of the wigs exposed in shop-windows, half-black and half-white, as specimens of the power of the various hair dyes.

Respecting the hair standing on end from fright or other causes, the earliest instance is that mentioned by Job (iv. 15): "Then a spirit passed before my face; *the hair of my flesh stood up*," etc. Virgil, Seneca, and Shakespeare all allude to this. Dr. Washbourne says this is owing to the outer layers of the hair-follicle being derived from the corinum or "true" skin containing muscular fibres; these fibres, by the stimulus of mental emotion, contract, thereby causing the protrusion of the follicle, and consequent erection of the hair. The so-called "goose-skin" is caused by similar contractility. Some physiologists think that curly hair is produced from a flattening of one side of the hair more than the other.

The apertures of the skin in which the hair grows are so constructed that, after a head has become bald, all the oils and pomades that have ever been advertised are powerless to revive the growth of the hair. An eminent German counted the number of hairs in heads of four different colors: in a blonde one, he found 140,400 hairs; in a brown, 109,440; in a black, 102,962; and in a red one, 88,740.

The Assyrians were very particular about their hair; and the beard was curled and plaited, as any one may observe in the Nineveh marbles in the British Museum. In that collection, an auburn wig, found in the Temple of Isis, at Thebes, is preserved: it must have been in the tomb upwards of two thousand years. The Egyptian kings had gold thread interwoven with their

beards. This nation shaved their heads and chins, and wore wigs and *artificial beards*. The beard of a god is represented in their sculptures as being turned up at the end. The Egyptian women, as appears by figures of Isis, cut it square round the neck; but that strange *coiffure* which is seen upon Egyptian figures, on coins of Juba and the Parthian kings, Count Caylus thinks to be a peruke of wool. Curling hair was used by both sexes among the Phrygians and Sybarites; the Armenians wore their hair twisted in the form of a mitre; the Persians, long, flowing, and curled; and the Arabians, cut upon the crown of the head.

The Jewish women kept their hair long, and also the men. Absalom's hair is said to have weighed two hundred shekels. Josephus tells us that Solomon, on grand occasions, was preceded by forty pages with their hair powdered with gold-dust. It is on record that Mausolus, king of Caria, to whose manes Artemisia erected the celebrated tomb, had a number of wigs manufactured, and then ordered all his subjects to be shaved, in order to compel them to buy his perukes at any price, to recruit his exhausted treasury.

The Greeks were very chaste in the arrangement of their hair; both sexes gathered it up into a kind of knot on the crown of the head, which was often ornamented with a grasshopper. They used hair-dye, for we read that the sculptor Miron, aged seventy, fell in love with Laïs; and, after he had been repulsed, had his white locks dyed black, and asked again; but she replied: "How can I grant thee to-day what I refused to thy father yesterday?" Ælian describes the tresses of Atalanta as being golden or tawny. Evelyn says the Greeks shaved the heads of their children, leaving locks on each side, which they afterwards consecrated to their divinities.

The Romans were more elaborate than the Greeks about their hair. As the slaves were invariably cropped, the Roman gentlemen cultivated long hair. The Emperor Commodus powdered his with gold-dust. Martial says:

> A beau is one who, with the nicest care,
> In parted locks divides his curling hair;
> One who with balm and cinnamon smells sweet,
> Whose humming lips some Spanish air repeat.

They used a liquid for turning the hair black, prepared from leeches which had been left to putrefy for sixty days. But a dye that changed dark hair to fair was the most fashionable; it was made of a soap composed of goats' fat and ashes. Martial calls it Malliac balls, from Mallium in Germany. Ovid reproaches his mistress for having destroyed her hair by the use of injurious dyes. Ladies even cut off their hair, if dark, to replace it with a flaxen wig. When a man attained his majority, he shaved off his beard, and presented it at the temple of one of the gods. Nero presented his to Jupiter Capitolinus. Shaving continued in fashion until the time of Hadrian, who let his beard grow, to cover the imperfections in his chin. Galen tells us that, in his time, women suffered much from headaches, contracted by standing bareheaded in the sun, to obtain this golden tint, which others attempted by the use of saffron. St. Gregory Nazianzen, extolling his sister, says: "She has no *yellow hair* tied in knots and arranged in curls." The Romans began to cut the hair about 454 A. U. C., when Ticinus Mænas introduced barbers from Sicily. Many busts and statues in the Vatican, and elsewhere, have actually marble wigs upon them.

Diodorus Siculus says that the Britons, who had red hair, washed it in water boiled with lime to make it redder. The ancient Gauls had a like custom of washing the hair with a lixivium made of chalk, in order to make it redder. At the beginning of the French monarchy, the people chose their kings by the length of their hair. The Venetian ladies dyed their hair a gold color by a preparation consisting of two pounds of alum, six ounces of black sulphur, and four ounces of honey distilled in water.

Long hair was a distinguishing feature with the Danes. In an ancient Danish poem, *The Death-song of Lodbroc*, we have mention made of "the lover of the *lady beauteous in his locks*." The

hair of King Canute hung in rich profusion over his shoulders.

In the Anglo-Saxon illuminations of Prudentius, the hair appears to be cut short; but long hair was fashionable in the time of Edward the Confessor —persons not noble being obliged, as in France, to cut it round upon the middle of the forehead. In Anglo-Saxon manuscripts, the beard and hair are frequently painted *blue*. Strutt, remarking upon this, says: "In some instances, which are not so common, the hair is represented of a bright *red* color, and in others, it is of a *green* and *orange* hue. I have no doubt existing in my own mind, that arts of some kind were practised at this period to color the hair; but whether it was done by tinging or dyeing it with liquids prepared for that purpose, according to the ancient Eastern custom, or by powder of different hues cast into it, agreeably to the modern practice, I shall not presume to determine."

Time has very little effect upon hair. The auburn locks of the Countess D'Albini, wife of the founder of Wymondham Abbey, were found to be as fine and glossy as if just taken from the head of a living person, when her tomb was opened seven hundred years after her burial. The Norman ladies colored their hair to give it a yellow tint. In the twelfth century, the hair was parted from the front of the forehead to the crown. Astrologers speak of fit days for combing the hair, so that it is probable our ancestors did not perform that operation daily. In the reigns of Henry III. (1216) and Edward I. (1272), the hair was worn very bushy at the sides, and arrayed in large curls. Chaucer says the locks of the young squire were curled as if laid in a press. The same author thus describes Emelie in the *Knightes Tale:*

Hire yelwe heer was browdid in a tresse
Behynde hire back, a yerde long, I gesse.

The ladies in the thirteenth century gathered up the hair into a net or caul of gold thread, replacing the gracefully arranged *couvre-chef* of the previous century.

In the fourteenth century, the hair was parted on the forehead, and confined at each side of the face, usually in plaits; a gorget or wimple covered the neck, and was drawn up over the chin, strained up each side of the face, and generally fastened across the forehead, which was encircled with a fillet, ornamented with jewels. Over the head a veil was drawn, which fell down upon the shoulders. In the latter part of the century, cauls or close caps were worn, made of network, in which the hair was confined round the face. The fronts were frilled in various patterns. Some of the cauls were of gold and silver network ornamented with jewels at the intersection.

Soon after the commencement of the fifteenth century, the side cauls of the crespine head-dress were always of large size; frequently the outer edges were elevated above the forehead, so as to form horns; hence these head-dresses were called *horned*. About 1470, the wired or butterfly head-dress began to be much in fashion, especially among ladies of rank. The hair was strained into a richly ornamented cap, over which a veil of fine materials was extended, making altogether a very preposterous affair. At the end of the century, a kind of bonnet was used. Its leading characteristics were long frontlets or lappets, which formed an angle over the forehead, and hung down at each side. The steeple head-dress, with a long veil hanging down behind, was also in fashion in this century. In the sixteenth century, ladies wore kennel-shaped bonnets; afterwards, small circular caps; and then a kind of close linen cap, projecting forward at each side of the face, often with a jewelled fillet over the forehead, and a lappet dependent behind. At the end of the century, the hair was brushed back from the temples, and the French hood had the lappet at the back thrown forward over the top of the head; and broad-brimmed hats were worn, which were much used among the Puritans in the seventeenth century. A calash or hood was also used.

Mr. Rimmell, in his *Book of Per-*

fumes, says that there are three styles principally adopted by a Chinese lady for dressing her hair, which styles indicate whether she is a maid, wife, or widow. From her infancy to her marriage, a young girl wears the back part of her hair braided into a tail, and the remainder combed over her forehead, and cut into the shape of a crescent. On her wedding-day, her head is decorated with a crown covered with tinsel-paper; and on the next day her hair is dressed for the first time in the well-known *teapot* style. On holidays, she ornaments it with flowers. When she becomes a widow, she shaves part of her head, and binds round it a fillet, fastened with numerous bodkins, which are sometimes very costly. The men shave their heads, keeping only on the summit a long tuft of hair, of which they are very proud, although it was originally a mark of their subjection to the Tartars.

The Abyssinian ladies and gentlemen put a great deal of rancid butter on their heads. The Bedouin Arabs of Mount Sinai have their hair plaited and so arranged as to resemble a horn placed on the forehead. The Fejee Islanders dye their hair blue, red, and yellow, in patches; and the natives of the Duke of York's Island smear it with grease, and then sprinkle it with colored powders. In the Britannia Islands, people take a good deal of trouble to make their black hair look white.

The Puritans denounced long hair with great virulence. Dr. Hall, in 1643, says: "Some men have long locks at their eares, as if they had foure eares, or were prick-eared; some have a little long lock only before, hanging downe to their noses, like the taile of a weasall; every man being made a foole at the barber's pleasure, or making a foole of the barber for having to make him such a foole." Brides were always married with the hair dishevelled. In Middleton's *Roaring Girl* (1611), we read:

> Untie your folded thoughts,
> And let them dangle *loose as a bride's hair.*

Shakespeare, in *The Merchant of Venice*, says: "Her sunny locks hang on her temples like the golden fleece." He only mentions black hair twice throughout his entire plays. Every one who walks through any large collection of works of the old masters, the National Gallery, for example, must have noticed the remarkable absence of black heads. Before noticing *wigs*, we must say a word on the ladies' head-dresses of the eighteenth century. About 1760, the fair sex wore them towering about three feet above their heads. Hair-dressers considered that when thus decked they would *keep* for three weeks; but insects soon bred in the flour and pomatum with which they were bedaubed, and receipts for killing them are given in the newspapers of the period. For fear of disarranging these ponderous head-dresses, ladies frequently slept in chairs, instead of going to bed. The managers of theatres complained that those seated behind could not see the performance by reason of the large head-dresses in front; and in a caricature called "A new Opera-glass for 1777," a gentleman is represented looking through one of the great curls by the side of a lady's head, using it for an opera-glass:

> Behold how Jemmy treats the fair,
> And makes a telescope of hair!
> How will this suit high-headed lasses,
> If curls are turned to optic glasses!

The head-dresses were happily reduced about 1790, and soon declined altogether.

Louis XIII. wore his hair very long, and wigs were invented to allow his courtiers who were not so favored by nature to follow the fashion of the king. In the reign of Louis XIV., perukes were made of vast size, and even children wore them. Full-bottomed wigs were invented by the French barber Duviller, for the purpose of concealing an elevation in the shoulder of the Dauphin. The earliest notice of periwigs occurs in the privy purse expenses of Henry VIII., where we find, under December 1529, an entry of twenty shillings "for a

perwyke for Sexton, the king's fool." By the middle of the century, their use became frequent. Enormous periwigs were worn *temp.* Charles II.

Up to 1714, wigs were made of the natural color of the hair, but after that date they were bleached; but as they looked after a time a dirty gray, *hair-powder* came into use, to make them look white; that is, it was then applied to wigs, but had been in use long before, being, as some think, introduced by Marie de' Medici; at any rate, it is mentioned by L'Etoile in 1593.

A writer in the *Monthly Magazine* (1806), says, that Charles James Fox, *c.* 1770, actually used *blue* hair-powder —"he had his chapeau bras, his red-heeled shoes, and his *blue hair-powder*."

Pitt taxed hair-powder in 1795, and its use soon declined. Pigtails succeeded, and were generally worn in the army, but in 1808 were ordered to be cut off altogether, to the great delight of the military world.

More than one hundred tons of hair are annually taken at Paris. A great deal of this comes from Brittany, where the girls cover the head with a white cap, and the absence of their beautiful black ringlets is not noticed. Mr. Francis Trollope, in his *Summer in Brittany*, tells us what he saw at a fair in Collenée. "What surprised me more than all were the operations of the dealers in hair. There seemed to be no difficulty in finding possessors of beautiful heads of hair perfectly willing to sell. We saw several girls sheared, one after the other, like sheep, and as many more standing ready for the shears, with their caps in their hands, and their long hair combed out and hanging to their waists. By the side of the dealer was placed a large basket, into which every successive crop of hair, tied up into a wisp by itself, was thrown. No doubt the reason of the indifference to their tresses, on the part of the fair Bretonnes, is to be found in the invariable 'mode' which covers every head, from childhood upwards, with close caps, which entirely prevents any part of the hair from being seen, and, of course, as totally conceals the want of it. The money given for the hair is about twenty sous, or else a gaudy cotton handkerchief. They net immense profits by their trip through the country."

In the London Exhibition of 1862, Messrs Hovenden exhibited a head of hair six feet long, from the head of an English lady.

Another source of false hair is the combings of the ladies of Paris. The *chiffonier* picks out the hair from the heaps in the gutters as he goes his rounds, and this is sold to the hair-merchant.

UNCOMMON FOOD.

IN the war between France and Prussia, we heard much of the use of horse flesh as an article of food. No less than thirty thousand horses are said to have been eaten at Metz during the siege. This diet, however, was not a novelty in France, but had found many advocates in time of peace.

It is now about fourteen years ago that the late Isidore Geoffrey de St. Hilaire published a series of letters on alimentary substances, and especially on the flesh of the horse, which was pronounced to be highly nutritious. The Faculty of Paris declared it to be in every respect equal to the flesh of any other animal, with the advantage, that the proportion of fatty substance was less than that of the bullock, and a strong gravy soup might be made, much easier of digestion, and in every way superior to that of beef. In 1858, what may be termed a "horse" banquet was given in Paris at the Grand Hôtel du Louvre, which was presided over by the famous *gastronome*, M. Chevet, who had given the advantage of his culinary genius to the preparations. About sixteen persons partook of a variety of dishes, and they were pronounced excellent. In 1865 and the following year, equine banquets on a

larger scale took place in Paris, and enthusiastic speeches were made by several well-known naturalists, with a view to popularize the subject, and the sale of horse meat in the butchers' shops was permitted by an imperial *ordonnance.*

During the campaigns of the First Empire, the armies, when shortened in their ordinary provisions, subsisted on horse flesh. In the retreat from Moscow this furnished the daily rations from the commissariat. The French, however, have not led the way to hippophagy; they have simply followed up the precedent of Germany, Russia, Belgium, Denmark, and other countries. In Austria, during 1868, nineteen hundred and fifty-four horses were slaughtered for food. But there can be no doubt that horse flesh has been eaten by different nations from remote periods. This practice among the Germans excited the indignation of Pope Gregory the Third in the first half of the eighth century. At the siege of Antioch in the first crusade, towards the close of the eleventh century, the horses of the besiegers were either starved or killed for food in such great numbers that, of the seventy thousand with which the siege was commenced, before the third month not more than two thousand remained.

A superior distinction in taste seems to be accorded to the flesh of the donkey, great numbers of which animal have been and are still slaughtered for food by the French. A letter from M. Darcel, at Paris, dated November 3, 1870, addressed to the "Journal du Havre," after expatiating on the delicious flavor of the meat, declares it is to the horse that which veal is to the ox.

The gradual disappearance of the animals in the *Jardin des Plantes* during the siege of Paris suggests the use of still more uncommon kinds of food. Without further reference to the painful experience produced by the necessities of war, we may note some instances of uncommon food reported by naturalists and travellers.

Monkeys' flesh is by no means to be despised, though this may seem to some persons a near approach to cannibalism. Mr. Bates, in his "Naturalist on the Amazon," describes the meat of the spider monkey as the best flavored he had ever tasted. It resembled beef, but had a richer and sweeter taste.

There is a story told of the officers of a British ship dining with a mandarin at Canton. One of the guests wished a second helping of a savory stew, which he thought was some sort of duck. Not knowing a word of Chinese, he held his plate to the host, saying, with smiling approval, *Quack, quack, quack.* Imagine how his countenance fell when the host, pointing to the dish, responded, *Bow, ow, ow!*

The predilection for dog-eating is by no means confined to the Chinese, the Esquimaux, amongst others, vastly enjoying this food when the animals are young. A Danish captain who had acquired the dog taste, provided some of this food for a select party of guests, most of whom highly praised his *mutton.* After dinner he sent for the skin of the animal, which was no other than a large red dog. Captain Sir J. McClintock, who relates this story, adds that baked puppy is a real delicacy all over Polynesia. "At the Sandwich Islands, I was once invited to a feast, and had to feign disappointment as well as I could when told that puppies were so extremely scarce, that one could not be procured in time, and a sucking-pig had to be substituted." The same writer bears unqualified testimony to the excellency of seal-steaks when cut thin, and deprived of all fat.

The Malabar coolies are very fond of the "coffee rats," which they fry in oil or convert into curry. The pig rat is in similar favor. It attains a weight of two or three pounds, and grows to nearly the length of two feet. Rat pies are eaten in various parts of England; rat suppers used to be given periodically at an inn near Nottingham. The porcupine is esteemed a delicacy in Ceylon, and in flavor much resembles a young pig. In Siam the flesh of the crocodile is exposed for sale in the markets. Alligators are sometimes eaten by the natives of South America, Africa, and South Australia. The taste of musk is, however, so strong

that few strangers can eat them without being sick afterwards.

Elephants' hearts, we are told by Baldwin, in his "African Hunting," are very tender and good. The feet, baked in a large hole between bricks, are very glutinous, and not unlike brawn.

In Peter Martyn's account of the voyages of Columbus, he mentions the disgust experienced by the Spaniards when at St. Domingo, on being invited by the Indians to taste their favorite delicacy the guana, considering it a species of serpent. This dislike was, however, soon overcome. "These serpentes are lyke unto crocodiles save in bygness. They call them guanas. Unto that daye none of owre men durst adventure to taste of them by reason of theyre horrible deformitie and lothsomness. Yet the Adelantado being entysed by the pleasantnes of the king's sister Anacaona, determined to taste the serpentes. But when he felt the flesh thereof to be so delycate to his tongue, he fel to amain without all feare. The which thyng his companions seeing, were not behynd hym in greedynesse, insomuche that they had now none other talke than of the sweetnesse of these serpentes, which they affirme to be of more pleasant taste than eyther our phesantes or partriches."

Even dragons have yielded their share to the general provisioning of the human race, if we may credit Roger Bacon, who, in his "Opus Majus" (art of prolonging life), mentions as one of the ingredients of a preparation, the flesh of a dragon, which it appears was used as food by the Ethiopians. The mode of preparing this food cannot fail to amuse the reader: "Where there are good flying dragons, by the art which they possess, they draw them out of their dens, and have bridles and saddles in readiness, and they ride upon them, and make them bound about in the air in a violent manner, that the hardness and toughness of the flesh may be reduced, as boars are hunted and bulls are baited before they are killed for eating."

The partiality for raw food seems to prevail in many countries. Raw fish, thinly sliced, formed one of the delicacies placed before Lord Elgin at a Chinese banquet. Baldwin tells us that the Kaffirs eat alternately a lump of roasted bull's flesh, and an equal quantity of the inside raw. A species of salmon, unknown in Europe, called in Siberia the *nelma*, is esteemed by the Russians more delicious in its raw state than when cooked, and is eaten to provoke an appetite. "Later experience," remarks Ernan, in his "Travels in Siberia," "taught us how much the influence of the cold tends to favor the adoption of raw animal food, so much so, that it hardly requires the addition of salt; in fact, during the intense frost the raw flesh loses its repulsive qualities."

Wrangell adds his testimony to the superior flavor of raw frozen fish, seasoned with salt and pepper. Captain Hall, in his "Life with the Esquimaux," says: "My opinion is that the Esquimaux practice of eating their food raw is a good one; at least for the better preservation of their health. To one educated otherwise, as we whites are, the Esquimaux practice of eating uncooked meats is highly repulsive, but eating meats raw or cooked is quite a matter of education. 'As the twig is bent the tree's inclined,' is an old saw as applicable to the common mind of the people in regard to the food they eat as to anything else. When I saw the natives actually feasting on the raw flesh of the whale, I thought to myself, Why cannot I do the same? and the response to my question came rushing through my brain, independent of prejudice—because of my *education*, because of the customs of my people from time immemorial. As I stood upon the rocky shore observing the busy natives at work carving the monster before me, my eye caught a group around one of the vertebræ, from which they were slicing and eating thin pieces of ligament that looked white and delicious as the breast of a 'Thanksgiving turkey.' At once I made up my mind to join in partaking of the inviting viands actually smoking in my sight. Taking from

the hands of Ugarng his seal-knife, I peeled off a delicate slice of the spinal ligament, closed my eyes, and cried out 'turkey,' but it would not go down so easy; not because the stomach had posted up its sentinel to say 'No whale can come down here,' but because it was tougher than any bull-beef in Christendom. For half an hour, I tried to masticate it, and then found it was even tougher than when I began. At length I discovered that I had made a mistake in the way of eating it. The Esquimaux method is to get as vast a piece into their distended mouths as they can cram, and then, boa-constrictor like, first lubricate it over, and so swallow it quite whole! An old woman kindly came to me and offered a generous slice of the *whale gum* she was feasting on. Reaching out my hand, with one stroke of her *ood-loo*, an instrument like a mincing knife, she severed the white fibrous strip as quick as thought. It cut as old cheese; its taste was like unripe chestnuts, and its appearance like cocoa-nut; but I cannot say that this experiment left me a very great admirer of whale's gum."

The natives of the Sandwich Islands eat turtles, dolphins, flying-fishes, etc., raw, considering that the flavor is lost in cooking, and the richest possible treat they can enjoy is to haul a fish from the water and literally eat it to death. The Rev. Mr. Stewart mentions: "At Siho Siho the queen, Pauhai, was seated *à la Turc* on the ground, with a large wooden tray in her lap. On this a monstrous cuttle-fish had been placed, fresh from the sea, and in all its life and vigor. The queen had taken it up in both hands, and brought its body to her mouth, and by a single application of her teeth, the black juices and blood with which it was filled gushed over her face and neck, while the long sucking arms of the fish, in the convulsive paroxysm of the operation, were writhing about her head like the snaky hairs of a Medusa."

Sir Francis Drake says of the Patagonians that they fed on seals and other flesh, which they ate nearly raw, casting four or six pounds' weight in the fire until it was a little scorched, and then tearing it in pieces with their teeth like lions, both men and women. Davis, in his second voyage to Greenland, in 1589, describes the natives as eating all their meat raw, drinking salt water, and eating grass and ice with great delight. Captain Hall, in his recent "Life among the Esquimaux," found the natives making a meal of smoking hot seal-blood, and on tasting it, found it excellent, much to his surprise. The practice was to stand in a circle, each man taking a mouthful, and passing the dish to the next until the round was made.

In new Guinea, the tripang, and similar marine slugs, are cut up into small pieces and eaten raw with salt and lime juice.

Let us turn to another description of food, uncommon to us, but affording luxurious repasts to other nations. Locusts have been eaten from remote antiquity; the Arabs mix them with dough, and make excellent cakes of them. The Hottentots get fat upon them, and prepare from their eggs a brown or coffee-colored soup. In the Mahratta country they are salted, and in Barbary they are preferred by the Moors to pigeons. The latter usually boil them in water for half an hour, throwing away the head, wings, and legs; sprinkling them with salt and pepper, and frying them, adding a little vinegar. At Natal, the locusts are collected in the evening in sacks by millions, and afterwards steamed in close vessels over a fire, then dried in the sunshine, and after being freed from their legs and wings by a kind of winnowing, are stored in baskets in the granaries like corn. The dried locust is ground to powder between stones, and converted into a kind of porridge with water. It appears that the Kaffirs grow quite fat in the locust season. Dr. Livingstone tells us in his South African travels that, for want of other food, he was compelled to eat locusts: and, strange to say, when roasted, he preferred them to shrimps!

Some entomologists tell us that caterpillars have a taste of almonds, and spiders of nuts. However this may be as regards the former, we are

told by Spedman that large quantities of spiders, nearly an inch long, were eaten by the Kaffirs, and by the French colony of New Caledonia. In Europe there are instances of spiders exciting a kind of gourmand taste. Reaumur gives an instance of a young lady who never saw a spider without catching and eating it. A clever woman — Anna Maria Schurman — used to eat spiders like nuts, as regards the cracking process, and excused her propensity by saying that she was born under the sign Scorpio. Lalande, the famous astronomer, was particularly fond of spider food; and a German is mentioned by Rozel, who used to spread spiders upon bread-and-butter, observing, in his imperfect knowledge of English, "that he found them very useful."

Humboldt tells us that he has seen Indian children drag out of the earth centipedes eighteen inches long, and more than half an inch broad, which they ate with eagerness. Insects' eggs are eaten by the Arabs and Mexicans; grubs of insects in the West Indies by both white and black men, who empty, wash, and roast them. The Mexican Indians prepare a liquor from a beetle, which has stimulating properties.

The Greeks ate grasshoppers, and liked them amazingly; the aborigines of New South Wales used to eat them raw, first taking off their wings. The Chinese thriftily eat the chrysalis of the silkworm, after making use of the silk; the larvæ of a hawk-moth are also much relished. The blacks in Jamaica eat the Bagong butterflies after removing the wings, and store them up by pounding and smoking them. The Hottentots eat the termites, or white ants, boiled and raw, and thrive well upon them — the female ant in particular is supposed by the Hindoos to be particularly nutritious; and Broughton, in his "Letters written in a Mahratta Camp in 1809," tells us that they were carefully sought after, and preserved for the use of the debilitated Lurjee Rao, Prime Minister of Scindia, chief of the Mahrattas. The natives mix them with flour, and make a variety of pastry: the method is to parch them in pots over a gentle fire, stirring them about as is done in roasting coffee. They eat them by handfuls, as we do comfits: the taste is said to resemble sugared cream, or sweet almond paste. "I have discoursed with several gentlemen," observes Smeathman, "upon the taste of the white ants, and on comparing notes we have always agreed that they are most delicious and delicate eating." Dr. Livingstone says "the white ants, when roasted, are said to be good, somewhat resembling grains of boiled rice. An idea may be formed of this dish by what once occurred on the banks of the Zouga. The Bayeiye chief, Palaui, visiting us while eating, I gave him a piece of bread and preserved apricots, and as he seemed to relish it much, I asked him if he had any food equal to it in his country? 'Ah!' said he, 'did you ever taste white ants?' As I never had, he replied, 'Well, if you had, you would never have desired to eat anything better.'"

Humboldt mentions ants as being eaten by the Marivitunos and Marguer-atares, qualified with resin as a sauce. Bees are eaten in Ceylon. It is probably bad taste to allude to the mites in myriads that we consume in our cheese. The grub of the palm-weevil, which is the size of a thumb, is a favorite dish in some parts of India. Ælian relates of an Indian king, who for a desert, instead of fruit, set before his guests a roasted worm taken from a plant (probably the larva of this insect), which was thought very delicious.

Hindu Maxim. — Narrow-minded men, who have not a thought beyond the sphere of their own outlook, remind one of the Hindu maxim: "The snail sees nothing but its own shell, and thinks it the grandest palace in the universe."

Thinking and Acting. — Men are capable of greater things than they perform. They are sent into the world with bills of credit, and seldom draw to their full extent.

EARTHQUAKES IN NEW ENGLAND.

IT may not be generally known, that more than 230 earthquakes have occurred in New England and vicinity, since 1638, which have been authenticated. The following extracts are made from "HISTORICAL NOTES ON THE EARTHQUAKES OF NEW ENGLAND. 1638–1869. By William T. Brigham, A. M., A. A. S.," who has given much attention to this subject. These extracts, as will be seen, are for the most part descriptive of some of the most notable ones which have occurred in this region.

Eighteen years after the Pilgrims landed at Plymouth, they felt the first earthquake most of them had ever experienced.

Winthrop says: "Between three and four in the afternoon, being clear, warm weather, the wind westerly, there was a great earthquake. It came with a noise like a continued thunder, or the rattling of coaches in London, but was presently gone. It was at Connecticut, at Narragansett, at Pascataquack, and all the parts round about. It shook the ships which rode in the harbor, and all the islands. The noise and the shakings continued about four minutes. The earth was unquiet twenty days after by times."

January 26, 1662, three violent shocks were felt in New England; chimneys were thrown down. *November* 6, another in the same place.

February 5, 1663, *N. S.* Morton tells us that "at the shutting in of the evening, there was a very great earthquake in New England, and the same night another, although something less than the former, and again on the seventh of the same month, there was another about nine of the clock in the morning." This earthquake was severer in Canada than in the plantations of Massachusetts Bay, and Charlevoix assures us that trees were uprooted, chasms opened, and the course of rivers changed. Clavigero, in his "History of Mexico," declares that it overwhelmed a chain of mountains of freestone more than two hundred miles long, and changed that large tract into a plain; and this has a singular confirmation in the "Journal des Scavans."

The substance of Charlevoix's account is as follows: About half-past five in the evening, the heavens being very serene, there was suddenly heard a roar, like that of a great fire. Immediately the buildings were shaken violently, and doors opened and shut of themselves with a great slamming. Bells rung without being touched, and walls split asunder, while the floors separated and fell down. The fields were raised "like precipices," and mountains seemed to be moving out of their place. Animals were terrified, and uttered strange cries. For nearly half an hour the trembling lasted, a most unusual time, but it began to abate in a quarter of an hour after it first began. The same evening, about eight o'clock, there was another equally violent shock, and within half an hour two others less violent. The next day, "about three hours from the morning, there was a violent shock, which lasted a long time; and the next night some counted thirty-two shocks; of which many were violent." Nor did these earthquakes cease until the July following. New England and New York were shaken, as well as Canada, but in a less degree, and the whole territory convulsed, so far as can be learned, extended nearly three hundred miles from east to west, and half as many from north to south.

On the shores of Massachusetts Bay, houses were shaken so that pewter fell from the shelves, and the tops of several chimneys were broken; but as many of the latter were of rough stone, they were the more easily overthrown.

November 8, 1727. About forty minutes past ten o'clock in the evening, during a perfect calm, clear air and serene sky, a heavy rumbling noise was heard. At first far off, it grew louder, and in about thirty seconds the shock came. Houses shook and rocked as if falling to pieces. Pewter and china

were thrown from their shelves. Stone walls and chimneys were shaken down, and it was difficult for men to stand up. The ground seemed to rise and fall as the vibration passed. The shock commenced about half a minute from the time the noise was first heard, rose to its maximum in about a minute, and then decreased in half a minute. The direction was from northwest to southeast. At Newbury, and about the mouth of the Merrimack River, the shock was most violent. Rev. Benjamin Colman, D. D., says: "There the earth opened and threw up many cart-loads of a fine sand and ashes, mixed with some small remains of sulphur."

On Tuesday, *November* 18, 1755, at 4 hours 11 min. 35 sec., after a perfectly calm night, with the moon, which was near the full, shining brightly, the shock came. Like the other earthquakes of New England, this began with a roaring noise from the northwest, like distant thunder. A man who was on the road at the time, heard the noise and recognized its nature as it grew louder, and in about a minute he felt the shock, which resembled a long rolling sea; and the swell was so great that he was obliged to run and catch hold of something to prevent being thrown down. The tops of two trees near him, one twenty-five and the other thirty feet high, waved, he thought, ten feet. This motion was repeated, and then came a smaller one, and it was supposed that the shock was passed. "But instantly," Winthrop says, "without a moment's intermission, the shock came on with redoubled noise and violence, though the species of it was altered to a tremor, or quick horizontal vibratory motion, with sudden jerks and wrenches. The bed on which I lay was now tossed from side to side; the whole house was prodigiously agitated; the windows rattled, the beams cracked, as if all would presently be shaken to pieces."

In Boston, the damage done was considerable, as is shown by Professor Winthrop. "Besides the throwing down of glass, pewter, and other movables in the houses, many chimneys were levelled with the roofs of the houses, and many more shattered and thrown down in part. Some were broken off several feet below the top, and, by the suddenness and violence of the jerks, canted horizontally an inch or two over, so as to stand very dangerously. Some others were twisted or turned round in part. The roofs of some houses were quite broken in by the fall of chimneys; and the gable ends of some brick buildings thrown down, and many were cracked. The vane upon the public market-house was thrown down; the wooden spindle which supported it, about five inches in diameter, and which had stood the most violent gusts of wind, being snapped off."

All through the country stone fences were thrown down, but especially on a line extending from Montreal to Boston. New springs were opened, and old ones dried up. At Pembroke, Scituate, and Lancester, in Massachusetts, chasms opened in the earth; and at Pembroke "there were four or five of them, out of some of which water issued, and many cart-loads of a fine, whitish and compressible sand were spewed." In the harbor the shock was felt by those in vessels as if they were beating upon the bottom; and immediately after the earthquake large numbers of fish came to the surface, some dead and others dying.

Mr. John Hyde says: "Many chimneys, I conjecture (from observation) not much less than an hundred, are levelled with the roofs of the houses; many more, I imagine not fewer than twelve or fifteen hundred, are shattered and thrown down in part."

In *March*, 1861, there were two shocks in Massachusetts, according to some reports. July 12, about 9 P.M., a shock was felt at Montreal, Ottawa, Prescott, Ogdensburg, Brockville, Saint Andrews, and St. John's, but it was most violent at Ottawa, where it overturned chimneys. According to Prof. Dawson, it was, in several places, preceded by a dull noise, then a series of light vibrations, which were terminated by a sudden shock. At Prescott, three shocks were reported.

How Heroes are Made. — The general whose name thrills a nation with grateful pride, does not become a hero by the force of lofty conception, but by the patient acquisition of military details, and constant business-like care for the food, dress, and health of his men. Ten thousand tedious trifles attended to, and disappointments borne, go to the making of a triumph. "See, the conquering hero comes!" is an excellent tune. But before this he has had to march in the mud, pore over crumpled maps, and work vulgar sums after midnight, by a flickering lantern in a gusty tent. While you were snoring in a feather-bed, he has slept on the ground in wet clothes and with the toothache. He has had to taste rations, inspect harness, disarm jealousy, hire carts, eat mouldy biscuit, digest opposition. He has studied with buoyant interest during the dull routine of peace; he has met the commonplace emergencies of warfare with strong common-sense; he has been blessed with a good liver, and has kept his wits at his finger-ends year after year; and now, but not till now, has the steady fire of his life burned up into a national triumph, and the mob claps its dirty hands at his approach.

Everybody almost, in these days, who wears a black coat, and has a name and habitation, expects his friends to write him Esquire. This assumption—which it really, in many cases, is — seems to have been an old foible. In an old newspaper we find the following: — "This city is overrun with a set of idle and mischievous creatures, which we may call town squires. We might soon levy a very numerous army, were we to enlist every vagrant about town, who, not having any lawful calling, from thence takes upon himself the title of gentleman, and adds Esquire to his name."

Why Coffins are High-priced.—Tam Neil was carpenter and precentor in Edinburgh, and a very droll character in his way. Being questioned one day by a lady at whose house he was employed, as to the reason why people of his profession were so exorbitant in their charges for coffins, he looked very mysterious, and agreed to give the necessary information in return for a glass of whiskey. The stipulation being implemented, Tam said, "Weel, ma'am it's juist because they are ne'er brought back to be mended."

The Advantage of Having a Trunk.—In reference to the overloading of animals, Sir Charles Napier gives an anecdote of an elephant: — "Moll allows them to load him as much as they like, and then deliberately with his trunk takes all off again beyond the quantity he thinks fair to put on his back. They dare not put anything on again." [Pity but the horse had a trunk! He might then unseat half-a-dozen of the passengers of an overloaded coach. It is too true, that the problem which people undertake to solve when they hire a coach is, how many it will hold, not how many the horse can draw.]

A learned clergyman was accosted in the following manner by an illiterate preacher who despised education: — "Sir, you have been to college, I suppose?" "Yes, sir," was the reply. "I am thankful," rejoined the former, "that the Lord opened my mouth without *any* learning." "A similar event," retorted the clergyman, "took place in Balaam's time; but such things are of rare occurrence at the present day."

The servant of a Prussian officer one day met a crony, who inquired of him how he got along with his fiery master. "Oh, excellently!" answered the servant, "we live on very friendly terms; every morning we beat each other's coats; the only difference is, he takes his off to be beaten, and I keep mine on."

Is the Earth Solid? — In summing up this inquiry, the balance of evidence appears to be decidedly in favor of the hypothesis that the interior of our earth is a mass of molten matter arranged in concentric layers or zones according to their respective densities, and the whole enclosed within a comparatively thin external crust or shell.

A Scotch blacksmith being asked the meaning of metaphysics, explained it as follows: — "When the party who listens disna ken what the party who speaks means; and when the party who speaks, disna ken what he means himsel' — that is metaphysics."

Infallible Remedies.— For corns, easy shoes; for bile, exercise; for rheumatism, new flannel and patience; for gout, toast and water; for the toothache, a dentist; for debt, industry; and for love, matrimony.

PEACE.

Pass on Earth's winter, let thy reign
  Of darkness cease; no more
Be seen thy terrors, or be heard
  Thine awful tempest's roar.

Come on, Earth's summer, with thy realm
  Of light; let sea and river,
Nations and lands, bask in thy beams,
  And peace prevail forever.

Pass, Mortal life, with all thy strife
  And all thy grief; no more
Be known thy pains; at last let toil
  And weariness be o'er.

Come, Immortality, O come!
  From all our woe deliver,
And bear us to the balm and bloom
  Of peace and love forever.

Rev. Charles Naismith.

GOOD HEALTH.

A POPULAR JOURNAL

ON THE LAWS OF CORRECT LIVING.

STIMULANTS.

THE class of stimulants includes natural agents by which we are all more or less surrounded, as light and air, and others derived from nature, but which have been discovered, and their usefulness appreciated, by degrees. It includes, again, others which are developed in our intercourse with our fellow-men, and are most powerful for good or evil: emotional stimuli — love, hope, fear; mental stimuli, if we may so call them — ambition, love of praise, avarice, etc. But these can only be regarded as stimuli insomuch as they are motives to increased mental or physical effort, and therefore productive of increased vital activity; they are of too metaphysical a character to be further discussed here, though they are well worthy of deep consideration; for a due control over their actions, and the maintenance of a just balance between them, are the distinctive marks of the well-regulated mind.

We have most of us noticed a flower which has unluckily come into existence in a dark cellar, how pale and sickly it looks, and how soon it dies; remove it to the bright sunlight, and it immediately flourishes, and puts forth new shoots and green leaves. In the busy and crowded city we may have seen a child reared below ground in a cellar, but rarely seeing the light save through a dirty window, or contaminated by the dank vapors of a filthy street: the child looks sickly as the plant, and would as surely die, only it crawls into the scanty light, and has a little better chance of life, though it be but a meagre existence. The pale, flabby look and stunted growth are common both to the child and the plant, because sunlight is a direct stimulus to the formation of healthy blood, both in the plant and the child, and color is the best sign we have of this health. Light, then, is one all-important stimulant: it is a vital or vivifying stimulus, *i. e.* one of those external conditions necessary for the maintenance of life in organized beings.

Pure air is another well-known stimulant, though, like light, it would hardly be looked upon as such, were we in the city, not constantly in our every-day existence in a certain lack of supply, so that to us, and more particularly to those living in crowded rooms and streets, a week or two in the pure air of the country becomes the most powerful stimulus to the restoration of health; hence the extreme value of country hospitals for the reception of those in whom impure air has produced disease, or in whom the shock of an accident or surgical operation cannot be recovered from, without the stimulus of purer air than can be found even in our well-ventilated city hospitals.

The air of elevated regions is more truly stimulant, producing its effect, no doubt, by quickening and deepening the respiration, and hastening the circulation of the blood through the lungs, brain, and other organs. The effect of mountain air is to exhilarate the spirits, and induce a feeling of buoyancy and strength which is most pleasurable. We remember being impressed on one occasion, on arriving at the top of the St. Gotthard Pass, after a long day's travelling, at the feel-

ing of renewed health and strength we almost suddenly experienced: it induced us to stay for a couple of days there; and we could not but remark the unusul brightness and cordiality of feeling written on the faces and displayed in the manners of our fellow-guests; they all seemed to feel, like ourselves, in perfect health, and equally amiably disposed. The pleasant, energetic manners of our host seemed natural to him, and a part of his splendid physical health.

Cold has a highly stimulating effect when judiciously employed. Cold baths, the douche, and cold sponging, stimulate the circulation, the respiration, and the action of the skin. The whole body is thus invigorated, and a good standard of health maintained which renders us better able to resist disease. Fevers, consumption, and even simple colds, as a rule affect those first whose general health is below par. At Biarritz, and some other French bathing places, hot water is provided for the feet on returning from the bath. By this very simple and obvious means, delicate persons can enjoy sea-bathing without experiencing the depression and chilliness which often render this luxury a very hazardous one.

Variety of scene healthfully stimulates the mind: the most stolid of men often feel a kind of ecstasy on seeing a beautiful view; but there is a certain gloom attached to some of the grandest scenery which renders it too oppressive for many.

Before proceeding further in the consideration of stimulants, we must pause to define the meaning of the term. It will have been gathered from what has preceded that a stimulant is an agent which increases vital activity; and we need only add that when this effect is produced upon all the organs and functions of the body, the agent is said to be a general stimulant; when limited to one or two organs, a local stimulant; when to the part to which it is applied, an irritant.

In ordinary conditions of health, apart from any special call upon the vital energies, in persons taking a reasonable amount of mental and physical exercise, and enjoying an equally reasonable amount of rest, there is no actual necessity for taking stimulants of any kind; but in civilized countries it is so universally customary to take stimulants in more or less moderate quantities, that it is now looked upon as a natural habit.

There is no habit which is so disposed to grow upon one as that of drinking. Even water-drinking, apparently so harmless, becomes, with some people, a most pernicious habit: they cannot exert themselves in any way without drinking water; they are regularly in the habit of drinking many glasses of water daily between meals. This habit is an injurious one; it greatly weakens digestive power, hastens waste, and very probably tends to produce corpulency. Unfortunately, however, water-drinking is far less frequent a habit than beer-drinking, which, in quantities very far short of intoxication, is much more injurious. By water-drinking we dilute our tissues, by beer-drinking we contaminate them; yet how very common it is to meet with people who never miss the opportunity of taking a glass of beer—inpependently of that which they take at meal times! When a train stops, or a coach changes horses, they rush to the counter; at races, fairs, cricket-matches, they take sundry glasses. We constantly meet such men: they are what is called temperate, frequently highly industrious and intellectual. The physician often meets them; they come under his notice at about middle age, miserable hypochondriacs, suffering from all varieties of indigestion, gout, and liver disorders; and would be astonished to know that years have been taken off their lives principally by the effects of a habit they have acquired so gradually, and regard so lightly.

A still more dangerous habit than the last, acquired in the same gradual manner, and indulged in often with the same ignorance of its results, is that of taking small quantities of spirits, either "neat" or with a little water,

at intervals during the day — what is vulgarly called "nipping." This habit is most common with coach-drivers, hack-men, and conductors. They are not drunkards, though in too many instances they ultimately become so.

We have often sat by the side of the driver of a coach, a merry fellow well known all along the road, exchanging a word or a joke with every one. He stops some five or six times in a course of fifteen miles, and usually has a small glass of spirits each time; he commonly calls for a glass of gin and water *cold*, with a defiant emphasis on the last word, as much as to say, "I'm none of your fiery liquor drinkers." Poor fellow! he is irremediably damaging his health, as surely as if he chose the most ardent liquor distilled, but perhaps more slowly. The physician again meets these men; they die in hospitals of liver and kidney diseases. The immediate, or at least the primary, reason for indulging in this habit is the false idea that "it keeps the cold out," whereas it has proved over and over again, that spirits, though they temporarily cause a sensation of warmth, actually lower temperature, and hence it is that the unlucky "nippers" have so often to renew their stimulant. This habit is also largely indulged in by women, and becomes even more fatal to them than it does to men.

We have too frequently seen the miseries of debasement, disease, and untimely death brought on by this habit, not to feel a responsibility in dealing with the topic. A very few words will suffice upon the effects of alcohol taken in intoxicating quantities. Intoxication is a temporary insanity, which is in itself criminal, inasmuch as it is voluntarily induced; hence it is regarded in law as no extenuation of crime; it is "a derangement of the functions of the mind, and, as these are in some way connected with those of the brain, it seems probable that it is by acting on this organ that spirits when taken into the stomach occasion death." Drunkards often become seized with a peculiar delirium, called *delirium tremens*, from the nervous agitation with which it is accompanied. We will not pause to describe this terrible disease, which often terminates in sudden death.

Numerous cases of spontaneous combustion have been placed on record, and are firmly believed in by many; some have even been described with great minuteness; and an eminent Italian physician and medical jurist relates the phenomena which occur in this accident. There is no doubt that corpulent spirit drinkers are unusually combustible, and might be more readily set on fire than others; but there is no evidence to prove that they could ever catch fire spontaneously.

One of the effects of alcohol is to diminish the tissue change going on naturally in the body; and it might be argued that this effect can only be salutary and useful in persons who work hard and have but scanty food. This is an important use of alcohol as a drug in some exhausting disorders of short duration, from which, by keeping the patient alive for a short time longer, he is enabled to recover, while if stimulants are withheld, he must die exhausted before the complaint in its natural course has worked itself out; but we are here guided by a definite knowledge of the natural course of acute diseases, and by alcohol sustain the patient, and, as it were, restrain the ravages of the fire within certain limits compatible with life until it has burnt itself out.

In health it is different. There is an exact correlation in the human body between the forces supplied to it in the shape of food, the chemical processes that go on within it, as oxidation, waste, and nutrition, and the vital forces, muscle force, nerve force, mental force, which are exhibited in the thinking, acting man, and some of which (nerve force) react upon the functions of his body and regulate them. Oxidation is the great means by which the active forces of the human body are set free, *e. g.* warmth, muscular action, brain action, etc.; and if, by taking large quantities of alcohol, we lessen the amount of this oxidation, we lessen the amount of the vital forces to which it gives rise: thus we lose as much as we gain. On the other hand, if in

acute disease this oxidation is in too great an excess, we may sometimes check it by administering aclohol as a drug. Persons who partake largely of alcohol have also, as a consequence of this lessened oxidation, much half-changed material in their blood, which, had the oxidation been more complete, would have been wholly removed. They are thus prone to disease, and often succumb to accidents which would be trivial to healthy men.

Prolonged indulgence in alcoholic drinks produces a slowly progressing inflammatory change in the stomach, which gradually destroys its digesting power, and thus leads to many dyspeptic ailments. The liver and kidneys become affected in much the same way.

Children in health should never take stimulants.

Chloroform and ether are stimulants when taken in small doses, and increase the power of the heart's action; but if their administration is continued, consciousness is soon lost, and by their cautious use people may be maintained in an unconscious state for a long time with but little danger. This anæsthetic power renders them very useful in surgical operations.

Tea or coffee, or Paraguay tea (a South American substitute for tea), are consumed daily by three-fourths of the human race, and must, therefore, be most important articles of diet. We can, in this article, only briefly allude to their action as stimulants.

Much as these substances differ in appearance, odor, and taste, they contain but one common principle upon which their active properties depend. This principle is called *theine* or *caffeine*. It is a crystalline body, soluble in hot water, and containing nitrogen. It thus approaches more nearly to animal tissues in composition than alcohol, which is a mere hydrocarbon. The action of theine upon the human body is that of a nerve stimulant, and, secondarily, a stimulant to the heart; and it differs from alcohol again, inasmuch as this stimulant effect is not followed by any depression. It also increases the exhalation of carbonic acid from the lungs (which alcohol diminishes), thus increasing the activity of the oxidation or combustion going on in the body, and is, therefore, a useful drink during exposure to cold, while its action upon the skin renders it also a grateful drink in hot climates.

It is perhaps a significant fact that coffee is derived from the same natural order of plants (the *Cinchonaceæ*) as quinine and tea from an order (the *Canellaceæ*) closely allied to it. During the Antarctic Expedition it was much preferred by the men to spirits, and it is daily coming into more extensive use both in Algeria and India. According to Dr. Parkes, the best authority on military hygiene, tea and coffee are most important articles of diet to soldiers during active service; they can endure much greater fatigue under their use than when taking spirits, and are more cheerful, and better able to resist the baneful influences of the poisonous exhalations from marshes.

Since infusions of tea and coffee contain an astringent substance, tannic acid, which has the property of precipitating albuminous matters, they are not taken advantageously with meals at which meat is eaten. An aromatic oil, peculiar to each plant, is the cause of their differences in flavor. The oil to which tea owes its peculiar aroma is a most powerful stimulant. Green tea contains four-fifths per cent., black tea three-fifths. The Chinese rarely use tea until it is a year old. Green tea is prepared from the fresh leaves, which are quickly dried over a fire; hence its larger percentage of volatile oil. Black tea is prepared from leaves which are dried slowly after long exposure to air.

Ammonia, which is most commonly used in the form of sal-volatile, is a stimulant in two ways. Its pungent vapor applied to the nose will sometimes rouse a person from insensibility; or if applied to the skin, and evaporation prevented by a piece of oil-silk or glass placed over it, a blister is readily produced: this is its local stimulant or irritant action. If taken internally, it acts in the same

way as brandy, but not so powerfully, and its effect does not last for so long a time.

Mustard has long been in use as a condiment on account of its supposed stimulant action on the stomach: it, however, has been lately shown to have no effect in increasing the secretion of that organ, but it excites some irritation, which causes a sense of hunger and a larger amount of food to be taken. Mustard also, no doubt, stimulates the muscular action of the stomach, and in this way aids digestion. Curries act in much the same manner. They are taken in large quantities in India to excite the languid appetites common in hot climates, and often act injuriously on the European by inducing him to take more animal food than he can properly digest.

RICE.

"CAROLINA Rice" is acknowledged to be the best in the world. But why? Because American climate and American river bottoms are more congenial to it than those of Egypt and of India? Probably not, but simply because its right culture has been more intelligently studied and more scientifically pursued. The American planter has done by his rice only what the English farmer has done by his turnips — made its nature and habits *his own study* instead of leaving it to the clumsy notions of laborers, or even of superintendents.

Of all American husbandries, that of rice is the most picturesquely beautiful. The perfect level of the fields, dyked against encroaching tides, and intersected with canals and drains, like so many veins and arteries; the shining sheet of water by which it is first covered, succeeded in a few days by a coat of emerald green; then a mixture of overflowing water, and the green of the crop; finally, the rich-looking heads of a brilliant golden color, drooping with a gracefulness unequalled by any other grain, are beauties which arrest the eye of the most commonplace observer.

At the time of harvest the crop is cut by sickle, bound into sheaves, heaped temporarily into shocks or stooks, whence it is boated by means of the intersecting canals to the barnyard.

Preparation for Market.

Stacked in immense heaps in the barnyard, it is threshed at leisure, either by flails or machinery, and the grain carefully winnowed from the straw.

In this state it is known in America as "rough rice," in India as "paddy," and is now ready to be carried to the mill for "cleaning" or husking. The pearly grain is sheathed in a thin chaff, which fits it so closely and adheres so tenaciously that it can be separated only by heavy pestling, and then, by being rubbed in a kind of mill. In some parts of India the process of husking is said to be facilitated by scalding or parboiling; but American machinery renders this aid unnecessary. A winnowing process, followed by one of sifting, now separates the mass into five parts — first, the chaff; next, the flour, which is a detritus of the grain and chaff combined, and of a yellow color; third, the small rice, which consists of fragments of grain less than half, intermixed with much of the heart or eye of the rice; fourth, the middlings, made up of all grains below prime, but larger than the small; and fifth, the prime rice of commerce.

Of these several qualities the small rice is not in general favor as an article for the table, as it contains usually an uncomfortable proportion of gravel. But it is so much sweeter than the other qualities that a lady ignorant of the process by which it is produced is said to have remarked, "I wonder why people *will* plant large rice, when small rice is so much sweeter."

Its Uses.

1. As an article of food the grain is used in almost every possible form—whole, broken, half broken, coarsely crushed, reduced to powder, or dissolved. Breads of various kinds, and also cakes of delicate flavor, are made of it, combined with the flour of other cereals or used by itself. It is also prepared in the form of pilaus, pies, puddings, custards, soups, and gravies.

2. As a diet for invalids or for infants it may be pulverized in a mortar after a few minutes soaking in cold water; or it may be ground in a mill and prepared like sago, arrowroot, or tapioca; or, without pulverizing, it may be made into a light nutritious gruel by boiling and straining.

3. As a medicine, in relieving a disordered condition of the stomach and bowels, it is parched brown, then boiled and eaten; or it is parched of a darker brown, drawn as coffee or tea, and used as a beverage.

4. In the laundry, where a white pearly starch is required, capable of various degrees of stiffness, it is highly valuable.

5. In the manufactures its paste is moulded into a variety of tasteful ornaments, almost as hard as porcelain.

6. Rice meal, the detritus of chaff and grain already described, is a highly nutritious and fattening food for all kinds of stock, from horses to pigs.

7. The rough rice, or paddy, is the favorite food of the rice-bird, so highly prized by epicures, and is probably the source of its peculiarly delicate flavor. It may be given to poultry with similar effect, and it contains so much silex in its rough husk that while feeding on it they need no gravel for attrition in the gizzard. It is therefore peculiarly suited for poultry on long voyages, or in places where there is no gravel in the soil.

8. The chaff is in demand for packing delicate articles of glass or china ware, and for the transportation of eggs. It is at the same time so perfect a non-conductor of heat that it is said a block of ice p[illegible]y packed in it will withstand the [illegible] rays of a sun hot enough to open the seams of a vessel's deck.

9. The straw is manufactured into beautiful hats and bonnets, and also into mats and light baskets, and like the stalk of most other cereals, is used as a rough provender for cattle.

In the Cuisine.

A lady, familiar from childhood with the luxuries of a rice plantation, furnishes by request the following instructions:

1. To boil rice for the table à la Carolina.—First pick it free from rough grains and foreign substances; then wash it quickly in cold water, and hurry it to the pot before the grain is at all softened. As to the quantity of water to be used in boiling, there are two modes: one is to put in twice as much water as rice, and allow it all to be absorbed by the grain; the other is to put in three or four times as much water, but to pour almost all of it off as soon as the grain changes from its pearly white color and gives proof of having softened.* In both modes, when this stage of the boiling has been attained, the pot is to be withdrawn from the hot fire and set where it will be kept at a low steaming heat, until the water is all gone. This last process is called "soaking." Properly conducted the rice comes from the pot perfectly done, of a clear white, with each grain *firm* and *distinct*, and swelled to double its original size. Salt, of course, is to be added. Rice prepared in this way should *not be stirred* much in boiling, or it will become gluey; a large open fork passed through it once or twice will be sufficient.

2. Rice pie.—Chief ingredients: a pint of rice and a fat, tender fowl.—First boil the fowl in water enough to cook the rice, according to the rule just given. When the fowl is done take out the larger bones and cut it into small pieces. Spread a layer of the cooked rice on the bottom of a deep pan, and on it place a layer of the fowl, with butter and eggs mixed, and with

*It is at this stage, the water being poured off, that it is sometimes prepared for invalids by pouring in milk and boiling with sugar, spices, or other flavors, to suit the case.

black pepper and spices to suit. Alternate these layers until the pan is full, having a layer of rice at top, on which pour a mixture of butter and egg, and set the whole to "browning" in an oven or on the fire; then serve it at table in the vessel in which it is last cooked. This dish somewhat resembles in richness the celebrated pilua of the Turks.

INJURIES AND DISEASES OF THE LIDS AND EYE:

Their General Care and Treatment.

BY B. JOY JEFFRIES, A.M., M.D., BOSTON.

Burns from Lime, Acids, Alkalies, Caustics, Molten Metals, and Boiling Fluids.

Burns from lime in the form of mortar or plaster, are extremely dangerous; for, although they may not destroy the eyeball, they render the cornea opaque where they come in contact with it, and hence produce partial or total blindness. Moreover, they burn the inner side of the lids, and thereby cause these to adhere to the eyeball by fleshy growths, which it is almost impossible afterwards to separate so as to allow the globe to move with the necessary freedom. Olive oil dropped into the eye after it has been washed out with a week solution of vinegar, may be used before surgical advice can be obtained.

When any of the strong acids, like sulphuric or nitric, have come in contact with the eye, they act chemically on the tissues, and hence their danger. Immediately after such an accident, the eye can be syringed out with a solution of five grains of bicarbonate of potash to two tablespoonfuls of water, and sweet oil dropped between the lids. When some strong alkali, like caustic potash, or soda, has been dashed into the eye, we may wash it out with a teaspoonful of vinegar in two tablespoonfuls of water.

Scalds from hot water, and burns from liquid metals, etc., can be treated more or less like the same injuries in other parts of the body. Sweet oil can be dropped on and in the eye, and rags wet with it laid on the outside of the lids. The best surgical advice is needed at once. Avoid charlatans and advertising quacks.

Foreign Bodies in the Orbit.

I might relate wonderful cases of this character to frighten my readers with, but that is not my purpose in any way. I simply desire to teach them how to assist in saving their eyes when injured. All sorts of things are by force sometimes driven into the orbit; like

umbrella tips and handles, nails, hooks, keys, door-latches, etc. The great danger is the bursting of the eyeball, and the tearing of its surroundings, the stretching or wounding of the optic nerve, the injury done the walls of the orbit, either by fracture or by the foreign body penetrating them. The inflammation excited by a foreign body in the orbit, may prove fatal by extending to the brain. But, on the other hand, the most extraordinary cases have occurred in ophthalmic practice, where large foreign bodies have remained within the orbit without the patient's knowledge, and, when removed, the eye saved and sight restored.

It would be as impossible as out of place to attempt here to describe all the diseases of the eye, or give any plan of treatment which my readers could carry out. There are, however, some common affections of this organ that they can be taught to take care of, at least till proper medical advice can be obtained, and they may learn what *not to do* under all circumstances, if they read attentively and follow the directions I am about to give.

Sore Eyes of New-born Infants.

The best possible advice will not be too good for these cases. All sorts of quack nostrums, and old women's and nurses' prescriptions, are constantly used by even the intelligent and educated, by which many a poor child is rendered blind for life. The great secret of treatment of cases of this dangerous form of ophthalmia of new-born children, is perfect cleanliness, unceasingly carried out. This is only done by separating the lids, and with a small syringe, every two hours, washing out the secretion from the eye. Every other application, such as breast-milk, and all sorts of washes, only do harm. A physician alone can turn over the lids, and make such application as each individual case may require. The danger to the eye is, that the cornea becomes soft and breaks away, generally totally destroying the eye.

A Cold in the Eye.—Conjunctivitis.

From exposure to wind, wet, or cold, or even without apparent cause, the lining membrane of the lids becomes inflamed, giving the feeling of sticks or sand in the eye. If there is *no other trouble*, which the persons can rarely decide for themselves, some astringent solution, like five grains of borax, or two grains of sulphate of zinc, in an ounce of pure water, may be safely used. The chances are, however, and this especially with children, that there is, besides, a small ulcer of the cornea, no larger perhaps than the head of a pin,

which renders the case a very different thing, and for which the treatment I speak of is quite out of place.

Iritis.

Inflammation of the colored part of the eye, the iris, is a very frequent disease, causing dimness of sight, great pain, especially at night, and intolerance of light. Leeches to the temple, a shade over the eye, and the use of a solution of one grain of sulphate of atropia in a tablespoonful of pure or distilled water, is all I can recommend till the patient can get good advice, which, I again warn him, is not obtained from any one who advertises in any shape whatever. Proper treatment *early*, in all cases where there is great pain in the eye, increasing at night, will save the sight.

Granular Lids.

The lining membrane of the lids, especially the upper one, from various sources of irritation, takes on a form of inflammation which causes it to become thickened and rough. When thus rough, the constant motion of the lids over the cornea finally inflames that delicate structure, and gradually renders it opaque, and, consequently, the patient quite blind. Moreover, this goes on till the cornea becomes soft, and gives way, by which the eyeball is of course totally destroyed. Granular lids, when they exist, can only be seen by turning over the upper lid. Now I rarely have found that patients, except when they have been under proper care, ever have had the lids turned over for the granulations to be exposed. All sorts of quack eye-waters sold in the apothecary shops, and every variety of prescription, I find have been perseveringly used whilst the eyes have gone on from bad to worse. It is with granulations of the lids as with many other affections of the eye, namely, that they do not tend to get well of themselves, but are amenable to proper treatment.

Purulent Ophthalmia,

Called also Egyptian ophthalmia, contagious ophthalmia, military ophthalmia. This disease so dangerous for the eyes commences, and is at first like an acute attack of cold in the eye, but goes rapidly on to a much worse condition, the lids becoming greatly swollen, and the secretion of a yellow matter constantly exuding from between them. The corneæ break down with ulceration, slough off, and the eyeball is totally destroyed. How many persons have thus been blinded in a few days, whom active and early treatment would have saved from this misfortune! All I can recommend to be done till surgical assistance can be obtained, is the utmost cleanliness by

washing out the eyes, as I described with the same trouble in new-born infants. The minutest speck of the secretion coming in contact with the sound eye of another person, will excite the same disease in it, and thus it is spread through barracks or armies as a fearful scourge. Isolation of the cases, absolute cleanliness, careful destruction of all rags, etc., are indespensable, of course, and the best care and attention on the part of the surgeon, who not infrequently has fallen a victim to his devotion to his patients.

PTERYGERIUM.

I am obliged to use this professional name, as there is no common one in English. I mean a little fleshy-looking growth coming up generally from the inside of the eye in a triangular form, and encroaching on the cornea. It very rarely grows half-way over the transparent part of the eye in front. When of any size, it produces some irritation, and patients are most always afraid it will grow over and cover the sight of the eye. This almost never occurs. The old operation for removing this fleshy growth did not prevent its recurrence. Nowadays we strangle it, or transplant it below the cornea, where it either withers away or does no harm.

DISEASE OF THE MEMBRANES WITHIN THE GLOBE.

Very few of the diseases of the internal parts of the eyeball present, externally, any indication of their presence. Varying degrees of pain, intolerance of light, and dimness of vision, up to total blindness, are all the symptoms the ophthalmic surgeon formerly had to guide his treatment, till the invention of the ophthalmoscope, by Prof. Helmholz, revolutionized ophthalmology, or the study of the diseases of the eye, by allowing us, through this instrument, to see perfectly the interior of the eyeball, and tell exactly what disease exists, in what membrane, whether in the crystalline lens, the vitreous humor, the optic nerve, the retina, or the choroid coat, etc.

Of course, therefore, it is useless to speak here of these diseases, which the ophthalmic surgeon alone can see by means of the ophthalmoscope, and understands how to treat. Some forms of the diseases of the membranes within the globe are not amenable to treatment, are not curable. Before we could see just what they were, the unfortunate patients were naturally subjected to all sorts of treatment; of course, perfectly useless, and sometimes very hurtful both to the eye and general system. For instance, there is a form of blindness which begins to show itself as dimness of vision, mistaken for near-sightedness, in childhood, and goes steadily on to

total blindness at about forty-five years of age. The eye exhibits no external symptom, but the ophthalmoscope shows a most remarkable deposit of pigment in the retina, which tells the ophthalmic surgeon at a glance what the trouble is, and he knows nothing can be done. About one-third of such cases have been found to occur in the children of parents related to each other; first cousins, for instance. It certainly argues directly against such consanguineous marriages, distinct from many other reasons, equally convincing. Blind relatives, undoubtedly, run great risk in marrying.

Amaurosis.

This word was formerly used to denote about all the diseases of the eye where, as has been wittily said, the patient saw nothing, and the surgeon also. The ophthalmoscope, by revealing to us the interior of the eye, and hence the causes of almost all blindness, enables us to distinguish between one and another; for instance, between the blindness acompanying Bright's disease of the kidneys and diabetes, between several forms of disease of the optic nerve and the blindness caused by diseases in the brain, some of which latter are directly found out by the ophthalmoscope. Hence it is, that the word, as used by ophthalmic surgeons, no longer expresses a disease, but simply means the patient is blind, generally from some cerebral cause. It is, however, a word popularized by quack oculists and advertising charlatans, who tell their applicants that they have *amaurosis*, as if it was a distinct disease, and that they will cure them for so much money paid down, or so much a month.

Watery Eye.

The tears pass from between the eyelids, through two little canals in the inner angle of the lids, to a sack at the root of the nose, and from there, through a canal, to the nostril. This, as will be seen, is quite a long and circuitous route. If, in any part of it, there is trouble enough to stop up the canal or passages, then the tears escape from between the lids and run over the cheek, producing great annoyance, and finally serious disturbance of vision, and probably drawing down of the lids, and misplacement of the hairs on their edges. The collecting of the tears in the tear sack, at the root of the nose, causes it to inflame and produce a very painful abscess, which, when it bursts on the cheek near the eye, results in a permanent fistula, through which the tears constantly flow, and render the patient perpetually miserable, not to speak of the uncomfortable appearance of such a face.

The various methods of treatment I shall not, of course, attempt to describe here, as they would not be understood, and can only be carried out by the ophthalmic surgeon, who, as well as the patient, must have patience and perseverance with these cases which are the most difficult to cure. I am glad, however, to be able to state that modern surgery has greatly reduced the painfulness of the necessary operations, and much limited their extent and number. My readers will notice much fewer people going about now with the head of a pin exposed on the cheek, near the eye, the upper end of the old-fashioned style.

Styes on the Lids.

These should not be poulticed, but kept anointed with some simple fatty substance, constantly bathed with *hot* water, and opened freely as soon as ripe. One after the other occurring shows some disturbance of the general system, requiring appropriate constitutional treatment.

Ingrowing Eyelashes.

These come from many causes, principally the drawing in of the lids from burns, inflammation, granular lids, etc. To pluck out the hairs, no matter how carefully it is done, is but a temporary and uncertain relief. The irritation they produce not unfrequently destroys the eyeball, and very frequently causes more or less blindness, from gradual opacity of the cornea. The operations invented by modern surgery for these troubles have met with very brilliant results, when carried out by competent surgeons. The immediate relief from an appropriate operation on the lids is wonderful. The eyelashes need not always be sacrificed, but frequently can be retained as natural.

Tumors of the Eyelids.

These are of very frequent occurrence, as little knots or bunches, harmless unless they increase in size or inflame, when they should be removed, by an operation which is by no means a simple one, since such growths generally involve the whole thickness of the lids.

Use of the Eyes.—Protection and Protectors.

Common sense and their sensations must govern my readers in regard to the use of the eyes. An Argand gas-burner with a blue chimney, petroleum or oil lamps, moderators, etc., are all good enough lights, if we have *enough light* from them coming in the right direction. All light on our work, whether artificial or sunlight, should come from one side, and not be reflected by the paper or book before us into the eye. When the eyes are *weak* there is a

reason for it, and good advice should be sought at once. Don't try to find this from advertising quack oculists, or travelling spectacle sellers. All sorts of goggles are, as a general thing, hurtful to the eyes, and never should be bought or worn without advice. Smoked glasses, and green, do not give the needed protection, ease, or rest to the eye. The proper color is cobalt blue. All spectacle glasses are now manufactured of several shades of this color, which has a definite effect on the sun's spectrum, and alters the character of the light which comes to the retina, thereby stimulating it to give us what we call sight. This fact has but recently been discovered, and hence it is that one sees so many people going about with blue glasses. These are of great assistance in curing some affections of the eye. Of course these blue glasses also are now advertised, and hawked about successfully, because the purchaser finds them comfortable, and therefore buys them at four or five times their value. The special shade of blue which should be worn, must be decided by each individual case, by the surgeon, and not by the buyer or seller.

A Barber's Razor.—Recently we have professionally seen two of the worst cases of *Sycosis Contagiosum* which have ever come under our notice. Both patients were shaved by the same barber, and no doubt by the same razor as that used—for the barber acknowledges his fault—in shaving "a man with a bad chin." In one patient the yellowish scales have extended to the upper lip and sides of the face covered by hair. The vegetable nature of the disease, and the rapidity with which the seeds are transmitted from part to part, until the cryptogamic plant surrounds every hair follicle, is only too well known for repetition here. Our chief object in directing public attention to a most serious matter is, that barbers will learn, through us, to be more careful in indiscriminate shaving, and that the public seeking their aid will, for their own sake, insist upon what we hope will now become an universal practice in the barber-shop—namely, the razor to be immersed in some warm water before being applied to the face. This is pretty sure to destroy the vegetable organism, should any exist, on the instrument. Those who may have suffered from *Sycosis Contagiosum*, and the physician who has had experience in the treatment of it, alone know the protracted nature of a most unsightly complaint in yielding to treatment, and the value of the hint we offer in the simple immersion of the razor in warm water, and then wiped before use. Indeed, in the filthy barber-shops of our great towns, diseases of more kinds than *sycosis* are propagated; but with that we do not purpose entering upon now. Our simple desire being to record a painful occurrence with which we have recently met—a faithful corroboration of the testimony of Gustav Simon, of Gruby, of Vienna, and of the experiments made by Foville, who noted over and over again the transmission by contagion of *sycosis*, from the use of a razor employed in shaving an affected person.—*London Medical Press.*

"The more married men you have the fewer crimes there will be. Marriage renders a man more virtuous and more wise,—changes the current of his feelings, and gives him a centre for his thoughts, his affections and his acts."—*Voltaire.*

THE EDIBLE FROG.

IT is a question of some interest, requiring many considerations and some actual experiments for its solution, who has the best right to raise a laugh on the subject of frog-eating—the Frenchman who eats, or the American who does not? The favorite species with the French, for the table, is the edible frog, *Rana esculenta* of Linnæus. In this country the large frog of our inland streams and lakes is frequently used as an article of diet, and its flesh regarded as a great delicacy.

The green frog of France would be pronounced by careless observers larger than the common frog, but it is not so. It is fully as large, and far more handsome; its bright and beautiful coloring rendering it more conspicuous, and, therefore, apparently larger than our common species. It is eminently aquatic, and in this respect differs materially in habit from the common frog, which goes oftener upon land, and thrives in districts far removed from water. Another peculiar characteristic of this animal is extreme shyness, hence it is that those who procure frogs for the markets in France have to hunt in "melancholy marshes," and in the meres of sequestered woody districts.

As they spend the greater part of their time in the water, their habits can only be properly observed by patient and quiet watching; that they go through the same tadpole phases as other frogs need not be said. When their metamorphosis is complete, they feed ravenously and grow rapidly. The ordinary manner in which the creature passes both week-days and Sundays is to sit on a leaf in the water where the sun shines brightly and wait for a fly, or beetle, or butterfly to come within range, when it is snapped and swallowed in much the same way as the toad supplies himself when his dinner honors him with a visit.

To see a frog take a worm is to be mightily amused, or dreadfully disgusted, according as the observer may be inclined to take things as they come, and in the faith that "Whatever is, is right;" or under the blighting influence of the prevalent notion that only pretty things should be looked for in nature, and that the so-called "ugly" things are errors of creation. The tongue of the frog is soft, and attached to the edge of the jaw folding inwards; it is necessary, therefore, for it to keep a worm in the centre of the mouth while performing the tedious process of swallowing it, which may account for the grotesque performance of the animal when a worm constitutes its dinner. Master Frog first points at the worm as if its movements surprised him. He then turns his head aside like a coxcomb, and views it sideways with one eye, just as we may sometimes see a parrot take the measure of a nut that has been thrown into her cage. By this time the worm has made another twist, and the reptile makes a dash at it, grips it, and instantly loses it, owing to its vivacious wriggling. After a pause of a few seconds another plunge is made, the worm is secured, and as it is too large and too lively to be bolted, the frog labors with his forefeet to keep the worm in the centre of his mouth, and it is scarcely an exaggeration to say that he uses his feet in the manner of hands to poke the worm down his throat.

The green frogs, in common with our own frogs, pass a large portion of their time in the practice of rigid abstinence. It may be that both species feed freely from the beginning of June to the end of August, but it is highly probable that they never touch food through all the remaining nine months of the year; indeed, I never could persuade a frog to eat, except in those three months.

The note of this frog has been described as resembling "a loud snore, exactly like that of the barn owl." I always thought—if the horrible din they made at night in the breeding season did not utterly stupefy me—that it was a sort of infernal trumpeting with a nasal twang. The croak of a com-

mon frog is downright melody compared with it.

The green frog is such a beautiful creature that we might be justified in giving it special attention for that reason. It is, however, especially interesting, because of its employment as an esculent. It may be served up as a fricassee, and it may be made into soup. The cooking, however, is an important affair, and needs an experienced artist, or it is unfit to eat. In case any reader should be inclined to indulge a feeling of regret that the edible frog of France is not common in this country, the hint may be comforting that our American frog is every whit as good, and that, in fact, most frogs are edible, and every way worthy the attention of a skilful cook.

The Medical Education of Women in India. — On this subject the *Edinburgh Courant* thinks it may be interesting to know at this time, when so much difficulty is experienced by the females of different countries to get a medical education, that no such difficulty is felt in India, as may be seen from the following excerpt from a letter from the Inspector-General of Vaccination, in the North-West Provinces: — "I have just paid a visit to a girl's medical school in Bareilly. There were thirty girls, whose ages ranged from twelve to seventeen, all studying medicine under the sub-assistant surgeon and a matron. I examined them, and they answered very well indeed. They had a skeleton which they took all to pieces, and then one of them fitted it up again, giving the bones their Latin names. They are taught bandaging, which they do very neatly. One of the girls was supposed to have a broken leg, another a collar bone broken, another a jaw-bone, etc., and all the different bandaging was done most expertly. They study three years, and if they pass a satisfactory examination they are allowed to practise amongst poor Europeans and high cast natives. Their real function is midwifery, and it must be a great boon to native women who are not allowed to see a doctor to have such well-educated doctresses to attend them in their confinement. Twenty-eight of the girls were native Christians, and two were Mahomedans."

How to Cheat the Doctor. — A soldier, a patient at Herbert Hospital, England, a few days ago, wrote the following advice to a comrade: — "Previous to going to hospital rub your tongue with chalk, ready for the word, 'Put out your tongue;' then, when the doctor is going to feel your pulse, be sure to knock your elbow against the wall, and it will beat to any number in a minute; then, if you wish to persevere to be invalided, be on the look out for a friend to bring you a bit of raw bullock's liver every morning, in order to spit blood for the doctor; of course, have a little bit of the liver in your mouth, under your tongue, fresh, ready for him when he comes round the hospital ward, and have a good piece ready to spit out for him when he approaches your cot: then give a great sigh and a groan, and you are sure to be ordered lamb chops, chicken, rice pudding, port wine, Guinness's stout, in fact, you may live on the fat of the land for the remainder of your soldiering, which will not be long: but, depend upon it, you are sure of a pension, even under ten years' service."

We hope there are not many in hospital quite so clever as this "old soldier."

One of the French journals says that a society has been formed in Paris, now numbering more than a hundred members, each of whom declare that it is his wish that his body, after death, be used for the promotion of anatomical science.

Several cases lately of poisoning by chloral hydrate have been mentioned. They were people who took the drug without the directions of medical men.

Spirits given to a baby, or, what is much the same, drank by its mother, is poison for the body, and may be the starting of a habit which leads to ruin.

ON THE MEANS OF PRESERVING HEALTH.

BY PROF. SAMUEL KNEELAND, A.M., M.D.

Foods.

WATER is found everywhere in the human body; not only in the fluids, but in the solids; two-thirds of our weight is from the water we contain, so that the chemical definition of man, as forty-five pounds of carbon and nitrogen mixed in five and a half pails of water, is not an exaggeration. A dried mummy in the sands of Egypt, weighs little more than its desiccated bones. Water penetrates even our bones, and even in the solid teeth there is ten per cent. of this all-pervading fluid; three-fourths of the blood and the brain, nine-tenths of milk, and ninety-nine one-hundredths of the saliva and perspiration, are water. We require every day about three and a half pounds or pints of fluid for the maintenance of health and for the normal performance of the functions of secretion; this we take directly as drink, and indirectly with our food, and excrete it in variously altered forms by the skin, lungs, and kidneys. Water and other fluids in moderate amounts, taken into the stomach while eating, do not dilute the gastric juice, nor seriously interfere with digestion, as they are at once absorbed by the veins of this organ.

Starchy and Oleaginous Foods.

Starch we obtain from the cells in various parts of plants, and we are familiar with it as arrow-root, tapioca, sago, etc.; peas and beans contain one-third; wheat, rye, and oats, one-half; and rice and maize about three-fourths of this substance; potatoes do not ordinarily contain more than half as much as the smallest of the above amounts. By mixture with water, and the action of acid, starch becomes converted into sugar; the saliva acts in this conversion of our food, showing again the importance of the delay of starchy matters in the mouth by mastication and insalivation, as starch is not again acted upon by the digestive fluids until it reaches the intestinal canal. In germinating seeds, a part of their starch is converted into sugar, accounting for the sweet taste perceived in this state. Starch is all changed within the body, and is not found in the fluids or secretions.

Sugar is also derived from the vegetable kingdom, and is obtained from the juices of the cane, the beet, the maple, etc. It easily undergoes fermentation, producing alcohol, and is thus employed by almost all nations, civilized and savage. Sugar is also changed and

used up in the body, and is never discharged in the healthy secretions, except in milk.

Oleaginous substances are rarely found in the living body, except in diseased products, solid, as stearine, but fluid, like oleine. They do not mingle with water, but with alkali make an emulsion, and to this condition are they reduced in our food and the secretions. Fat has few vessels, and fewer nerves; it forms an investing covering to protect us from cold, and is remarkably developed in marine mammals, like the whale and seal. Like sugar, it enters into the normal composition of milk. It disappears also within the body, being used up in the process of respiration and animal heat.

Albuminous Foods.

It is the property of albumen to coagulate; that of the egg by heat, that of milk by acid. Fibrin, as in the blood, coagulates spontaneously. Under the influence of suitable heat and moisture, these enter into the state of putrefaction, being resolved into carbonic acid, ammonia, and water, which, in bodies committed to the earth, are absorbed by the roots of plants, themselves to be eaten by animals and man; thus goes on the perpetual change from the animal to the vegetable world, and back again to the animal by the beautful process of Nature; death is not annihilation, chemically speaking, but simply a change of form and combination of elements.

Meats consist of muscle and fat, with water; as water, 63.42; muscular tissue, 22.28; fat and areolar tissue, 14.30, in one hundred parts. They are generally regarded as nutritious in the following order: beef, mutton, and venison, fowls, game birds; veal, being immature, is less valuable, and pork, being usually surcharged with fat, is unacceptable to many stomachs, this organ not acting upon fatty substances. Man is well defined as the "cooking animal"; but the experience of all must convince them that domestic cooking, among us at least, is at a very low point; the greater part of our community may be said, from the point of view of cooks and servants, without regard to social position and wealth, to board with foreigners. It is "a consummation devoutly to be wished," that Prof. Blot and his school may soon elevate the practice of cookery to a science, and by interesting mothers and wives in this necessary household virtue, free us from the present horrors of servants' cooking, which threatens to destroy not only the tempers, but the stomachs, of the rising generation.

The albumen, or the white of eggs, is coagulated by boiling; the yolk is the oily part, which the gastric juice does not act upon,

explaining why certain persons cannot eat eggs without suffering from digestive trouble, which, for want of a better name, is often called biliousness. As oily food is digested only in the commencement of the intestine, where the biliary and pancreatic secretions are poured in, the constitution of the bile may doubtless be interfered with by this kind of food to an extent to cause unpleasant symptoms. Hence, to fry eggs is a bad way to cook them, as it renders them doubly fatty. As a rule, fried meats or cakes, or anything surcharged with fat, should be avoided, for the reason above given. Milk, as before stated, has all the four classes of food in its composition, water and mineral ingredients (sulphur, iron), albumen in the form of casein, fat, and sugar. The fatty portion, or the butter, is held in suspension in the water by means of the casein; when the rich cream is separated and beaten in the churn, the oil globules are broken up and adhere together; the water and albuminous parts are afterwards pressed out; if any casein remain, it is liable to become changed, to act as a ferment, and to cause rancidity; it is owing to about two per cent. of butyrine that butter from cows' milk has its peculiar flavor. Cheese is solidified casein, coagulated by the acid of the calf's stomach, the rennet; when coagulated, the watery parts are pressed out, leaving behind more or less of the oily portion, upon which the yellowness and richness of the cheese depend; it is a condensed form of nutriment, but rather indigestible, from the oily matter contained in it.

Bread.

Wheat flour contains about 7.30 in 100 of gluten or vegetable albumen, 72 of starch, and 5.40 of sugar; in the process of making bread, this is mixed with water, and yeast added; the latter is an albuminous substance, containing an abundance of a vegetable fungus, which multiplies its cells by budding rapidly when warm and moist, and acts upon matters containing sugar; the sugar of the flour is changed by the fermentation into carbonic acid and alcohol. The acid, being a gas, in its efforts to escape permeates and distends the tough dough, and the mass thus distended is quickly baked at a high heat; the gluten is thus fixed and solidified, and the loaf is large, light, and porous; any gas, even air forced into the dough, will make it rise, though the so-called aërated bread has rather an insipid taste, probably because the sugar is not acted upon as it is by the yeast ferment. Bread thus raised is no more nutritious, but is more easily chewed, and more quickly digested, because it is more readily penetrated by the fluids of the mouth and stomach.

The alcohol escapes by the heat of the oven. A pound of flour will make one pound and a quarter of bread.

Alcohol.

In making wine, the albuminous matter contained in the juice of the grapes, exposed to the air at a moderately warm temperature, becomes a ferment, and acts upon the sugar, converting it, as in bread, into alcohol and carbonic acid; but here the gas ordinarily escapes, and the alcohol remains; the wine finally becomes clear and transparent by a slow process. Some wines have sugar left, and are sweet as well as alcoholic. If wine be bottled before fermentation is over, the gas is retained, causing the sparkling and effervescence of champagne and similar beverages; sugar is often added to grapes deficient in it, and thus spurious champagne-like wines are made, including, probably, a large part of what is sold and used as champagne. The strength depends on the amount of alcohol; but as each grape has its peculiar properties and flavor, though the color of a spurious article may deceive the eye, and its flavor the tongue, the circulating fluid, into which it is at once introduced from the stomach, detects the cheat, as it sends the deleterious elements over the body, producing headache, and perhaps mischief of a lasting character in the digestive apparatus.

The use of fermented liquors by most nations, would seem to indicate a universal experience that they serve some important physiological purpose, and supply a common want. The abuse of alcohol is no argument against its proper use; the very fact that no saccharine liquid or juice of ripe fruit can be exposed to the air without spontaneous and rapid fermentation, would indicate some useful purpose, and physiology has attempted to find it out as a matter of medical science, without reference to the universally admitted evils of its use as a beverage. It is useless for the present purpose to inquire whether alcohol be food or not, and whether it leave the system unchanged or not; it may not enter into the composition of any tissue, but yet as a rapidly diffusible stimulant may arouse the dormant energies of the body, and thus awaken expiring life when slower acting agents would fail. Without nourishing or strengthening the system, it may serve a useful purpose in stimulating the nervous system. It is believed to increase the respiratory changes; to lessen the action of the voluntary muscles, and to increase that of the involuntary (as in the heart and lungs); and to diminish the activity of the skin and the waste of animal heat. The old-fashioned rum and milk, and milk punch, combining the nourishment of the

milk, and the stimulus of the alcohol taken medicinally, have been instrumental in saving many lives, and notably among the malarious regions of the South during the last war. Liebig thinks that alcohol is burned or oxidized in the system, and is therefore a heat-producing food; others deny this, maintaining that it leaves the body as it enters it, merely exciting the nervous centres; whichever theory be true, its medical use is justifiable, and even necessary.

Beer contains less alcohol than wine, and more nutriment, though, as far as the latter is concerned, it is a very poor way of utilizing the valuable cereals. It is made from barley, as wine is made from grapes. In the natural germination of seeds their starch is changed into sugar; the barley, being made to germinate by warmth and moisture, is ground up, and mixed with hops for the bitterness and flavor, and yeast for the ferment, with the usual result of alcohol and carbonic acid. Of course, if the bitterness be secured by other things than hops, a very deleterious article may be produced. The amount of beer which our Teutonic brethren can take, without other apparent trouble than the distension of the stomach, is well known. Some forms of ale, however, are so alcoholic as to be very intoxicating.

Though there be little, if any, real nutriment in alcohol, thirty-five out of the one hundred millions of gallons manufactured in the United States are consumed by the people in various drinks. This quantity, at two dollars a gallon, makes seventy million dollars; a small estimate, probably, of what we really pay for this poison. This gives over a gallon to each individual, and as the women drink little and the children none, the amount consumed by each male is perhaps not far from two gallons a year. Six or seven million barrels of beer are also consumed by us annually; and if to this we add the twenty millions consumed in Great Britain, and the equal, if not larger amount in Germany, and in France and Belgium, we may form some idea of the terrible waste of grains, used in producing what is of comparatively small value as nutriment. The effects of these stimulants upon health were very apparent in the British army in India, some years ago, where, out of an army of seventy thousand men, the deaths were about a brigade a day. As it was impossible to recruit an army under such a fearful mortality as that, the cause was diligently sought for, and ascertained to be the use of alcoholic beverages, which were thereafter forbidden, to the great improvement of the health of the soldiers.

BEVERAGES.

A physiological instinct seems to impel mankind to the use of certain unintoxicating, non-narcotic beverages, like tea, coffee, and cocoa, vegetable infusions or decoctions, containing an astringent principle, and a volatile and crystallizable body, rich in nitrogen. They are used from the equator to the temperate regions, and in both hemispheres; in Central America we find chocolate, in South America the maté or Paraguay tea (leaves of a species of *Ilex*), in the East and West Indies and South America coffee, in China, tea; the American Indians have their wintergreen and marsh tea (*Ledum*); in Ireland and elsewhere, shells, or the husks of the cocoa, are used. We find these beverages used in all countries, and in every condition of life, and they must meet an important physiological want; they contain essentially the same chemical compounds, and it is not a little remarkable that they should have been selected from such different classes of the vegetable kingdom. The nitrogenous principle, whether *theine* from tea, *caffeine* from coffee, or *theobromine* from cocoa, seems to be adapted to repair the exhausted brain and nervous tissue. These beverages also retard the waste of the tissues, diminishing the amount of urea and phosphates excreted, and rendering the necessary quantity of food less, at the same time stimulating the nervous system and the skin. Old people are fond of their tea; it lessens the decay of their tissues as nutrition begins to fail; it oils, as it were, the machinery of their bodies, and, by diminishing the friction, enables it to last longer. Some physiologists think that these substances increase the respiratory functions, and the excretion of carbonic acid by the lungs and the skin; promote the transformation of starchy and fatty foods into the albuminous, and lessen the animal heat, by exciting perspiration. Whatever they do, seven hundred millions of human beings use them, and, doubtless, from a physiological necessity, as yet not satisfactorily explained.

Condiments, like salt, pepper, mustard, and spices, are stimulants to the digestive organs, promoting the flow of saliva, gastric juice, and intestinal secretions; thus aiding digestion and the peristaltic movements of the alimentary canal. By giving flavor to food, nutritious though insipid, or spoiled in cooking, they increase the appetite by giving a relish, and often enable us to eat when otherwise the system might suffer. They also supply iron, phosphorus, and other mineral ingredients necessary for the blood, tissues, and secretions.

Horse-flesh.

While upon the subject of meats, it may be well to allude to the flesh of the horse, which the necessities of poverty, and more recently of war, have forced upon the attention of the French nation. We have been, for some years, familiar with the fact, that in France, as well as Belgium, there are regular markets for the sale of horse-flesh. A few years ago, a grand banquet was given by the director of the Veterinary School, at Alfort, near Paris, for the purpose of demonstrating the value of horse-flesh as an article of food; and, in order to give a fair trial, beside each dish of horse was a corresponding one in beef. With the exception of the director, none of the distinguished guests — the first men of the city — had ever partaken of this new food. The animal which furnished the specimens was an old horse, twenty-three years old, paralyzed in his hind quarters, and, therefore, though in other respects quite healthy, and very fat, not likely to furnish such good eating as a young and more tender one. The verdict in regard to the soup was unanimously in favor of the horse-flesh; it was declared to be of the same taste as the beef soup, but richer, stronger, more gelatinous, and more capable of concentration. "The banquet closed with a fine, fat, thick fillet of horse, larded and dressed like venison; it was triumphantly welcomed, and voted superexcellent; it was tender, juicy, high-flavored, more delicate and melting than venison, more gamy than beef. It was unanimously pronounced to be a great discovery, an immense addition to the pleasures of the table — a sort of mixture between venison, hare, and beef." Every guest begged that the cook would cut off a good slice, that he might carry it home, and let the inmates of his house judge of its excellence.

This must not be considered a mere rhapsody, which could emanate only from a nation which makes delicious dishes of frogs and snails, and whose culinary art can transform a dog into a rabbit, a cat into a hare, and a rat into a squirrel. There is no reason to modify the verdict of this enthusiastic French company, as all subsequent experience confirms the belief that in horse-flesh we have a nutritious, wholesome, and cheap substitute for beef. The natural repugnance to eat the flesh of unaccustomed animals is fast wearing away; and this meat of a domesticated animal, living upon the same food, and with the same cleanly habits as the ox and the sheep, bids fair to become an established article of diet in the Old World. Such is the cheapness and profusion of food in this country, that its use here will be longer delayed; but the time will soon come, espe-

cially in our great cities, when not only horse-flesh, but sharks' and skates' fins, and other now despised but excellent fishes, and even the lowly sea-weeds of our beaches, will contribute a large and desirable share of the food of the people. Horse-meat, *a priori*, must be regarded as far more wholesome than pork, which we so largely consume, from animals fed often on the most disgusting food, and whose lungs and flesh are very frequently diseased. Sailors are in the habit of calling their "salt junk" "old horse," and, perhaps, with reason, and often sing the following doggerel:

"'Old horse! old horse! what do'st thou here?'
'From Sacarapp to Portland pier
I've carted stone this many a year:
Till killed by blows and sore abuse,
They salted me down for sailors' use.'"

The time may not be far off, nay, it even is, when this sportive allusion may contain the truth, and yet be no hardship, even on the land, and in time of peace.

Lime Juice.—The importance of lime juice, especially on board ship, or in cases where it is impossible to obtain a sufficient supply of fresh vegetables, is a matter of the highest moment. Unfortunately, however, this useful article has of late been very much adulterated. Compounds of tartaric acid and sugar flavored, or mere solutions of citric acid fortified by vitriol, were formerly in vogue, although such practices are now, it is to be hoped, rendered impossible. But, even at the present time, the addition of proof-spirit to lime juice is permitted, to give it keeping properties. This is an admixture which must prevent its use to a great extent; and that it is really uncalled for is proved by a set of samples which proved on analysis to be thoroughly genuine, and all quite free from alcohol. Firstly, there was the pure lime juice, which possessed a specific gravity of 1.0255, and was found to be excellent in every respect; and, secondly, there were two preparations of the juice in more popular forms, and ready for use. The former was a syrup containing a notable quantity of lime juice, and the latter was an effervescing preparation of the same ingredients, which was really an admirable imitation of champagne minus the alcohol. Both of these preparations would form excellent and wholesome summer beverages.

The city of Dublin has taken the initiative in certain sanitary matters with a vigor which we earnestly trust may be imitated by all other towns. A raid has been very properly made on the confectionery and sweetstuff makers, and the poisonous wares found therein submitted for analysis. The result was even worse than those detailed from previous experiments. Chromate of lead, cochineal, vermilion (or mercuric sulphide), were the principal poisons in vogue, the first named in very large quantities. Here is the autopsy of a Dublin confectioner's baby: — The cradle was made of plaster-of-Paris and sugar; the body of the baby of sugar and rice starch; its eyes were Prussian blue; its cheeks of cochineal, and its clothes colored with chromate of lead. This one artificial infant had poison enough about it to have killed at least two live ones; and Heaven knows how many children have been sent to their last account by these manufacturers, not only in Dublin, but elsewhere.

ON POISONS.

AMONGST the organic poisons, prussic acid is perhaps most generally used; its effects are very deadly and very rapid, from the small quantity required to cause death, and from the ease with which it can be taken or administered to others, it has been too frequently used by the suicide and poisoner. The criminal records show that, next to opium, prussic acid has been more frequently used than any other poison for causing death. Dr. Guy states that in the years 1837–8, twenty-seven cases of poisoning by prussic acid came under the notice of the coroner; eight of these were suicides, and in each case the person was either a medical practitioner or a druggist. A short time ago the contents of a stomach were brought to the author for analysis; the poison found was prussic acid, and the suicide was a druggist. The ease with which the poison is procured by such persons, and the rapidity of its action, together with the knowledge which they possess of the apparently little suffering which it produces, no doubt causes it to be more frequently taken by them than by others who can only obtain it with difficulty, and who have no knowledge of its action.

Poison by prussic acid is, however, often accidental. The incautious use of substances which contain this poison has too frequently been the cause of death. The essential oil of bitter almonds, used as a flavoring for confectionery, if not properly purified, contains prussic acid, and very serious consequences have arisen from its being employed too freely. It may, however, be freed from prussic acid, to which its peculiar pleasant flavor is not owing, by treating it with lime and ferrous chloride (protochloride of iron) and distilling the mixture. The leaves of the laurel (*prunus laurocerasus*), the kernels of plums, cherries, and peaches, and the pips of apples, contain prussic acid, and death has been caused by taking too large quantities of some of them. Prussic acid belongs to the class of poisons termed *narcotic*; their action is on the brain and spinal marrow. The peculiar symptoms of narcotism are produced most completely by opium, whereas prussic acid seems to affect the heart and lungs. Opium stands at the head of the list of narcotic poisons, but it will be briefly considered after prussic acid, or as it is sometimes called hydrocyanic acid, and more correctly hydric cyanide. Prussic acid is a compound made up of hydrogen and a gas called cyanogen, which is itself a compound of carbon and nitrogen. Cyanogen contains twelve parts by weight of carbon, and fourteen of nitrogen. It is a poisonous gas, and is usually prepared by heating mercuric cyanide; it is decomposed by water, forming ammonic oxalate, amongst other products. When collected over mercury and burnt, it gives a beautiful pink flame, and yields carbonic acid and nitrogen gases. Prussic acid is usually prepared by heating potassic cyanide with dilute hydric sulphate (sulphuric acid), or more commonly by using potassic ferocyanide, instead of potassic cyanide. Potassic ferocyanide, generally known by the name of yellow prussiate of potash, is met with in well-marked yellow crystals; although yielding so poisonous a substance on its decomposition, it is itself harmless, and if, when swallowed, it has any action on the human frame, it is that of a mild aperient. The making of prussic acid is usually performed in a retort, and the volatile hydric cyanide is carefully condensed and collected in water. The pure acid, free from water, is made by passing the gas through a tube made in the shape of the letter U — this tube is filled with cyanide of potassium; a second U tube is employed, which is filled with chloride of calcium: the cyanide of potassium stops any hydric sulphate which might come over, and the chloride of calcium retains the moisture which accompanies the acid: to the chloride of calcium tube is attached a delivery tube, which dips into a glass flask sur-

rounded by a freezing mixture composed of ice and salt, and in this vessel the pure hydric cyanide is collected. Prussic acid is rarely met with in this state, it is always diluted with water, and preparations of it of various strength are used in medicine. Scheele's prussic acid contains four per cent. of the pure acid; but that prepared according to the directions of the pharmacopœia contains but two per cent. The aqueous solution decomposes, especially when exposed to light, and ammonic formiate is produced; the acid, too, is very volatile, and escapes readily if the bottle containing it be left open, so that, unless fresh made, ordinary prussic acid varies very much in strength. It may, however, be kept for a long time unchanged, if a few drops of hydric chloride (hydrochloric acid) be dropped into it; this action is not understood.

The odor of prussic acid is said to resemble that of the essential oil of bitter almonds; this, however, is an error, as oil of bitter almonds has the same smell when freed from prussic acid; its odor is sickly and very oppressive, and when once smelt is never forgotten.

Other salts of cyanogen, besides hydric cyanide, have been used as poisons, and amongst these cyanide of potassium is the most important. It is largely used by photographers, and is therefore more readily obtained than prussic acid, the hydrogen salt. It is, too, more dangerous, as its solution may contain a larger quantity of poisonous matter than either the acid of the pharmacopœia or Scheele's acid. Both prussic acid and cyanide of potassium produce similar effects on the human frame. The former is used in medicine, but in a state of great dilution; it allays pain and spasms, but if given in large doses it produces giddiness. It is often given in affections of the stomach to allay vomiting, and in cases of asthma, or where cough results from nervous irritation, it has a sedative action, and allays palpitation of the heart, especially when it arises from dyspepsia.

The vapor is sometimes employed to produce local action upon the lungs in chest affections; externally applied it allays irritation, but here it must be used in the dilute state. In large doses prussic acid acts as a violent and rapid poison, prostrating the individual at once; in a few seconds the symptoms come on, and in a few minutes death ensues, though there are cases on record where death has been delayed for forty-five minutes. After taking a poisonous dose, there is usually a short period of consciousness in which the person can perform voluntary acts. This fact is established beyond a doubt by cases recorded by Dr. Christison: "An apothecary's apprentice lad was sent from the shop to the cellar for some carbonate of potass; but he had not been but a few minutes away when his companions heard him cry, in a voice of great alarm, 'Hartshorn! hartshorn!' On instantly rushing down stairs, they found him reclining on the lower steps, and grasping the rail; and he had scarcely time to mutter 'Prussic acid!' when he expired, not more than five minutes after leaving the shop. On the floor of the cellar an ounce phial was found, which had been filled with the Bavarian hydrocyanic acid, but contained only a drachm. It appeared that he had taken the acid ignorantly for an experiment, and from the state of the articles in the cellar it was evident that, alarmed at its instantaneous operation, he had tried to get at the ammonia, which he knew was the antidote, but he found the tremendous activity of the poison would not allow him even to undo the covering of the bottle."

Another case is also one of an apothecary's assistant, who was found dead in bed with an empty two-ounce phial on each side of the bed. The mattrass, which is used in Germany instead of blankets, was pulled up as high as the breast, the right arm extended straight down beneath the mattrass, and the left arm bent at the elbow. That voluntary acts can be performed after taking sufficient prussic acid to cause death, is of great importance in medico-legal investigations. A young man, assistant to a medical practitioner, was ac-

cused of administering prussic acid to a servant girl. She was found dead in bed, lying in a composed posture, with her arms crossed over her body, and the bed-clothes pulled smoothly up to her chin; at her right side lay a small phial, from which about five drachms of prussic acid solution had been taken, and the cork was replaced in the bottle, which was wrapped up in paper. Various medical men were examined as to whether the woman could have performed all these acts between the time of taking the poison and of her death. Dr. Christison was consulted on the case, and the jury acquitted the prisoner. In order to cause death, prussic acid need not be taken by the mouth, dropped between the eyelids it is equally fatal in its effects. When injected into a vein it acts even more rapidly, and placed on a fresh wound it is absorbed, and causes death. In whatever way the poison is administered, the effects produced are similar: they consist of tetanic spasms, giddiness, quick-catching respiration, rattle in the throat, dilated pupil, convulsions of the limbs, rigid contraction of the jaw, and the person dies either in tetanic convulsions or comatose. If the dose taken be small, but yet sufficient to cause death, the patient survives a longer time, and then salivation occurs with difficult breathing, and he dies generally from suffocation. In some few cases narcotic symptoms, similar to those produced by opium, have been observed. After death the appearance of the person seems natural, the countenance is composed, but pale; the eyes have a glistening look, leading one to suppose that the life is not extinct. There is rigidity in the neck and limbs, often an odor of prussic acid from the mouth. On making a post-mortem examination, the smell of the poison is very marked on opening the cavities of the chest and abdomen. The blood is generally fluid, and the vessels of the brain are loaded with it; sometimes serum is found in the interior of the brain. The odor of prussic acid seems to hang about this organ, and Dr. Taylor says that it is even present where persons have died from natural causes. The bile is also said to have a blue color; this was noticed by Mertzdorff. Putrefaction sets in rapidly, although it has been asserted that it is delayed by the action of this poison.

What is the smallest dose of hydrocyanic acid which will cause death? Less than one grain of the pure acid has caused death in an adult. More than eight minims are rarely given as a medicine, and half a drachm, or thirty minims of the pharmacopœia acid would no doubt produce very serious symptoms. The treatment to be employed where a person has taken prussic acid, is to administer that which will render the substance inactive, or which will act in a manner opposed to it. The time, however, which one has at one's disposal is so short, that remedies are rarely of much avail, unless applied immediately after the poison has been taken. Sometimes in the laboratory one gets slightly affected by this gas, and then the remedy is to take ammonia or carbonate of ammonia, which usually counteracts its effects in a short time. A medical gentleman noticed a goat on his lawn eating laurel leaves; after a time the goat fell down, evidently affected by the prussic acid; he quickly administered smelling salts, which are mainly carbonate of ammonia, and the goat recovered.

Mr. John Murray, of London, expressed himself willing to take a poisonous dose of hydrocyanic acid if an experienced person were with him to administer ammonia as an antidote. There is no doubt that it has a very rapid and beneficial effect; the ammonia should, however, not be used too strong. Cold water dashed on the head, on the face, and back of the neck, may have the effect of rousing the patient. Chlorine has also been used, and experiments on animals made with it seem to prove that it acts beneficially. Iron forms inert compounds with cyanogen; it has therefore been recommended as an antidote. When the patient has been roused to consciousness by ammonia and the cold douche, the best treatment seems

to be to dry him carefully, use friction, and keep him warm. As soon as possible emetics should be administered, and, if necessary, the stomach-pump may be used. The detection of prussic acid is very easy, provided too great a time has not elapsed after death. The acid is volatile and easily decomposes, so that after a few days there would be little hope of finding it, if the quantity originally taken had been small.

Opium is a narcotic poison; it has been often used both by the suicide and murderer. Opium is obtained from the capsules of the *Papaver somniferum;* they are gashed and the gum exudes; it is collected and made into masses, which are sent into the market. The best variety is genuine Smyrna opium. Its preparations, when employed with skill, serve as most useful medicines, but when taken in excessive doses they act as a deadly poison.

Opium, when taken in large doses, produces giddiness and an inclination to sleep, stupor supervenes, and the person lies as if in a profound sleep. He can be easily brought to consciousness in the earlier stages of the poison's action, but he as soon relapses into insensibility. His breathing is slow and stertorous, like that of a person in apoplexy; his countenance becomes pale, his pulse slow, and after a time it is quite impossible to arouse him. Sometimes there is vomiting, and if this continue it indicates a hope of recovery. In opium poisonings the pupils are generally contracted. Generally the symptoms commence in less than half an hour after the poison has been taken, but sometimes not till an hour and a half. Death has occurred in three quarters of an hour, but some persons have lived for nearly twenty-four; the usual time is about nine or ten hours. When the fatal termination is delayed beyond this time, there is hope of the patient's recovery. The best treatment to be employed in opium poisoning is to use the stomach-pump at once, and to inject dilute stimulants, weak ammonia, water, and coffee.

Emetics may be used freely, warm water should be given, and the throat tickled. This may be done before the arrival of medical assistance. The patient should not be allowed to sleep, but should be kept awake by shaking, walking about, pinching, or in any way which may suggest itself. Cold water should be dashed on the head and face, and the soles of the feet tickled, the great object being to prevent stupor coming on. No part of the treatment is more important than this, for if lethargy be prevented there is good hope of recovery. Galvanism is sometimes resorted to. If the patient is sinking into the state of collapse, ammonia should be given, and ammonia salts held to the nose. Sometimes in this state artificial respiration is found to be useful. Post-mortem, the blood-vessels of the brain are found to be tinged, the blood is fluid, the stomach appears healthy, the skin is livid, and the lungs congested. The quantity of opium necessary to cause death varies; a man aged forty-five was killed by taking ten grains. The smallest fatal dose recorded for an adult is four and a half grains. Much, however, depends on constitution and previous habits. Those accustomed to take this drug may swallow as much as several ounces. Children are very easily affected by opium; a sixth, and even an eighth of a grain has caused death in an infant four days old.

Morphia is used in medicine as the acetate and as the hydrochlorate. Morphia is a whitish powder, not soluble, or very slightly soluble in water. It also occurs in crystals. When heated it burns with a resinous flame, and it yields ammonia. Morphia dissolves in ether, and also more readily in alcohol. It is soluble in acids, and is precipitated by caustic alkalies, but is redissolved by excess of them. It has a bitter taste. When it is desired to discover if opium be present in organic mixtures, it is usual to test for morphia and for an acid which is contained in opium, called meconic acid, and with which it is combined as meconate of morphia.

CONSUMPTION.

Disorders of Bronchi.

BY CARL BOTH.

THE lungs of a child, previous to its first act of breathing, are in a state of complete density, and have the appearance of being solid, instead of spongy. But, with the first act of respiration, they become filled with air, and expand like a balloon. And it should naturally take but a few minutes for the air to enter any one or all of the alveoles, or air-cells. This filling of the alveoles with air, and their consequent extension, is principally effected by means of crying. The child, by this act, closes the vocal chords in such manner as almost completely to prevent the escape of air, and thus forces it into all parts of the lungs, and hence its importance can hardly be overestimated. In fact, it is absolutely essential that a child should cry loud and often. This, however, should be understood in a common-sense way; for, if a child should cry *too* much, it would, by so doing, prevent the closing of the foramen ovale (a fissure between the two auricles of the heart, through which the blood passes during the embryonic state), and bring about the condition and symptoms called cyanosis (blue baby). Any well-developed child will naturally extend the lungs, in the manner indicated, of its own accord; but in our times of mental and physical weakness and fashionable folly, children are born that have not enough of cellular energy properly to perform their first attempt of eloquence. Nor does the mischief end here; for, in this country, the folly is sometimes carried so far as to prevent the crying of the child by giving soothing syrups and opiates, or alcohol, in some one of its many forms. As already indicated, there can be nothing of greater importance than a full and complete extension of the lungs, as otherwise the child will be unhealthy and sickly during its whole life. The walls of the neglected or non-extended alveoles after a short time adhere, and become entirely lost for future use, unless opened either by accident or art; which, in time, becomes more and more improbable. The discovery of the non-extension of the alveoles in young children is of a somewhat recent date, and is scientifically called *atelectasis*. It may occur in a whole lobe, or only in a lobulus, or it may be confined even to a single group of four or six alveoles. According to the magnitude of the defective extension of the alveoles, the characteristic symptoms are sooner or later manifested. If a whole lobe is thus neglected, a physician can be of no use whatever; for the child will invariably perish under symptoms of congestive cough, as in acute pneumonia, and with the appearance of more or less of blueness in the face (cyanosis). But if a lobulus only is affected, no such alarming symptoms as above indicated will ever appear. The space occupied by a lobulus is so small, and its use comparatively so little missed, that a child thus affected *appears* perfectly well and healthy. A defect of this kind can only be detected by careful examination and close watching on

the part of a competent physician. A child affected in this way will grow up very much the same as other children not affected, with the exception of a peculiar tendency to "taking cold," and of something being the matter with it every now and then. The teething gives trouble; the milk is not digested; the child appears nervous; finally, whooping-cough appears, — the symptoms of which are too well known to require description. But according to the popular idea, it should run its own course, and continue about twenty weeks. Notwithstanding the remarkably fine and exact observations of Niemeyer and others upon the general characteristics of this disorder, the peculiar spasms of the cough, in connection with the appearance of perfect health during the intervals, have thus far been a complete mystery. We are convinced that whooping-cough, in a majority of cases, at least, is caused by atelectasis; it being simply a last effort of nature to extend the neglected alveoles of the lungs, by using the utmost violence in her power. The fine bronchi which lead from the collapsed alveoles, for obvious reasons, are also necessarily in a state of collapse. The mucous glands, however, must begin to secrete that thin mucus which keeps the bronchi moist. But this secretion, not being expectorated or evaporated, accumulates, becomes degenerated, and causes irritation and consequent swelling of the bronchial glands and membrane. This inflammation is communicated to the neighboring healthy bronchi, which, in like manner, become affected, and prevents the free access of air to their alveoles. As soon as the oxygen in these alveoles is all used, the accumulated carbonic acid gas irritates the pneumo-gastric nerve, according to a law of physiology, and causes a tickling sensation in the throat, which makes the child cough. And the child will be obliged to continue coughing until the air is forced through the bronchi, thereby relieving the alveoles for a length of time, or until there is a similar accumulation of carbonic acid, when another fit of coughing must, of necessity, take place. During the intervals between the paroxysms of coughing, the child does not appear to have trouble of any kind, more than a person in health. Niemeyer states a most peculiar notion and significant fact in connection with an aristocratic lady, of Germany, who remarked that she had successfully cut short the spasms by whipping the child if it did not stop coughing. Niemeyer thinks that a child will cough more than is actually necessary; but, as we shall show, coughing and crying relieve the confined alveoles in the same way. The act of coughing is accomplished by a quick, spasmodic contraction of the diaphragm, contraction of the thorax, and the closing of the larynx by the vocal chords. The act of crying is performed by a slower contraction of the diaphragm, contraction of the thorax, and an almost total closing of the larynx by the vocal chords. Therefore, in both cases, there is necessarily a forced compression of the air in the chest, which, by mechanical action upon the swelled bronchi, releases the confined air of the alveoles, and thus gives relief. Whooping-cough is, therefore, caused by the swelled and inflamed condition of the finest capillary bronchi; the spasms occasioned by

the irritation of the confined carbonic acid in the alveoles, and the intervals of freedom from every symptom of disease, procured by the escape of the carbonic acid, and the entering of fresh oxygen.

We are inclined to the belief that a sudden fright, occasioned, for example, by a smart slap upon the child, would cause the above quick contraction of the diaphragm, and have the desired immediate effect of cutting short the spasm; but in no way would we be understood as regarding the whipping of a child a remedy for any kind of disorder.

The latest researches of Brown-Sequard on the influence of the nervous system upon respiration, are highly interesting and important as bearing upon this subject. In connection with Niemeyer's statement of whipping a child to stop the cough, he remarked, that the *will* was not only powerful enough to suppress a cough, but that even the tickling of the nostrils or the ear would very often immediately relieve a spasm. This fact he explained, not as the result of a simple reflex action, but maintains that such a different irritation upon another portion of nerves is capable of changing the physical and chemical condition of the cells of the gray mass, and thereby cause a different action of the brain. These highly-important matters have never been practically applied; — we shall return to this subject again farther on. Physicians being unacquainted with the mechanical facts about the above-indicated spasms, have not been able to find an effective remedy against them. A spasmodic cough may also have its origin in disorders of the heart, or of the brain, or it may be occasioned, even, by worms in the intestines; and hence that no specific treatment can be given, must be self-evident. The extract of belladona and morphine — which have been used throughout the past — act as a paralyzing agent upon the nerves, but in no way relieve the difficulty, and are apt seriously to injure the brain and the digestion of the patient. The proper remedy is to relieve the alveoles by fresh air. To accomplish this, the child, if old enough to comprehend the object, can be taught, by loud crying or artificial coughing at regular intervals, to compress the air in the chest, and thus avoid the exhausting and often frightful spasm of cough. But when the child is of such tender age as to be unable to comprehend the object or to perform the necessary acts, as indicated, the physician can do nothing more than to regulate absolutely the digestion. Any medicine whatever, beyond this purpose, is either foolish or quackish. And in this fact may be found both the reason and the justness of the claim of the Homœopathists, that their treatment in whooping-cough is productive of greater and better results than that of the so-called Allopaths. When nothing is the remedy, nothing *must* be productive of the best results.

No child with whooping-cough should ever be exposed to cold, or to too dry an atmosphere; but should be kept in an equally-warmed, yet properly-ventilated room. If this is strictly attended to, and the digestion of the patient regulated, whooping-cough should be invariably cured in from two to four weeks, except in cases of complication with other disorders. From the fact that children are apt to

cough into each other's faces, it is not advisable to bring healthy children into careless contact with sick ones. Admitting the possibility of injury by the sputum, by direct communication by coughing in the face, we positively deny any other kind of contagion in whooping-cough.

If the whooping-cough is arrested by correct treatment, the neglected alveoles may thereby become extended; but if otherwise, the child will be liable to future injuries, all of which have hitherto been explained as inherited Consumption (*Vulnerability of Virchow and Niemeyer*).

The Coughing and Raising of Blood is not an uncommon occurrence, and, until recently, was considered by physicians as a very dangerous symptom, it being regarded as a sure indication of lung disease. This, however, was a great error, as, in most cases, these bleedings have little or nothing to do with the lungs. In eight out of every ten cases, the blood comes from the trachea, or large bronchi, and not unfrequently from the posterior part of the nose. In such cases, there is nothing more serious than in nose-bleeding; which, however, under certain conditions, may arrive at a point of considerable danger. When the bleeding is from the bronchi, the lower down its source, the more serious it becomes. It is not difficult for an experienced physician, from the appearance and color of the blood, to tell very nearly from whence it comes. Very bright-colored blood almost always comes from the bronchial vessels, and the lower down it originates the more it will be mixed with the mucus. When blood comes from the lung-tissue, it is always very dark, and comes up pure, and generally in profusion. But bleeding very seldom originates from the vessels of the lung-tissue, it being generally occasioned by external injury, more seldom by internal degeneration. Although the raising of blood is very rarely a dangerous occurrence, it is always advisable to consult a physician in regard to it; especially for the purpose of ascertaining its cause and nature. For, though the bleeding itself may be of no consequence, it sometimes occurs as a symptom of a dangerous disorder, which may, perhaps, be easily removed, or clotted blood may remain in the bronchi, obstruct, and become a secondary cause of injury to them.

Patients, in general, become alarmed at sight of their own blood; and therefore we would here impress upon all who may happen to be present on any occasion, when blood is raised by any one, the importance of calm and cool self-possession. Every one should bear in mind, that a really dangerous lung-bleeding almost always carries off the patient very quickly; but that in most cases there is no immediate danger whatever, and that a fright under the circumstances will injure the patient more than the loss of blood sustained. In all such cases those in attendance should keep perfectly calm, and endeavor, by some little playfulness or pleasantry, to enliven and cheer the patient, who, in the mean time, should be placed in a half-recumbent position, and required not to increase the difficulty by

hacking or coughing, or by any effort to raise. With the exception of a little salt, or a small amount of vinegar, these being generally credited popular remedies, and which can do no harm, and may assist in quieting the patient, no attempt should be made by an unprofessional person to arrest the bleeding. In most cases nothing of a medicinal character whatever is required. Medicines possessing the necessary properties for the arrest of bleeding, should *never* be employed except in cases of real danger, which fortunately are of rare occurrence. To prescribe strong styptics, as secale cornutum, sugar of lead, large doses of opium, or strong resins, etc., except in cases of real danger, is, to say the least, very bad practice. Every educated physician knows that a blood-vessel very readily contracts of itself; — that a clot artificially produced by the use of styptics, sometimes prevents the contraction of the blood-vessel, and occasions secondary bleeding; and that to cause a coagulation of the blood, especially in the smaller bronchi, can be productive of no benefit, but rather of serious injury, to the patient. In a great many instances, patients have been injured more by their respective physicians than they would have been if left entirely without medical treatment. And here, as everywhere, we advise patients never to take any kind of medicine unless they are satisfied that the medical attendant fully understands the case, and is able and willing to explain its nature and origin. There is no case of bleeding which requires hurry, or blundering haste. If a large vessel is injured from any cause, the patient is beyond the reach of medical aid, and dies ere he is conscious of his own danger; and should a small bronchial artery be partially injured, it would be exceedingly difficult, if not impossible, to control the bleeding; but such an occurrence in the lungs is, however, one of very great improbability. If the patient is subject to bleeding, a very small injury may prove serious, and even fatal; but in ordinary cases, all that is necessary is a little rest and care, and the bleeding will be arrested by the processes of nature, sooner and better than by the use of any kind of medicine. But one of the most dangerous forms of bleeding is wholly internal in its character, giving no appearance of blood to alarm and warn the patient; and will be spoken of under chronic pneumonia.

[To be continued.]

The researches of Dr. Cobbold on the entozoa, or parasitical worms, that arise from sewage-irrigation, are calculated to throw us into still deeper perplexity as to the course which should be adopted in dealing with the sewage question. At the present stage of experiment, irrigation seems to be the most profitable and the most practicable; but a new danger threatens from this question, viz., the introduction into the human system of countless parasites and entozoa, through the medium of cattle fed upon sewage irrigation grass. The worst of it is that cattle which thus act as "bearers" of these abominable interlopers seldom show signs of the disease in themselves, as they appear to have the capability of resisting the effects of the presence of the parasites, except when the sufferers are young, as in the case of calves. Again, so little outward sign of disease does the meat show, that butchers are perfectly unconscious of it.

IMPROPER FOOD AS A CAUSE OF DISEASE AND DEATH IN INFANCY.

FROM the moment of birth the child is actively engaged in the work of development. The changes in its structure are necessarily great and rapid; the constant and hurried transition through which every part is passing is a fruitful source of disturbed action. It therefore requires the most vigilant care, with special and guarded dietetics.

The powers of digestion and assimilation in the young infant are exceedingly feeble. Indeed, Nature has so beautifully adapted the means to its wants that it is not required to perform much labor in this particular, for its natural food needs but little elaboration before it is prepared to be taken into its economy. The mother's milk, therefore, is its most suitable nourishment, and when there is nothing to forbid her nursing her child, she should regard it as her imperative duty to perform to it a mother's part, and give it the benefit of that food which Nature has not only prepared for it, but has also declared to be more or less essential to its healthy development. She should also remember that by an obstinate and cruel refusal to discharge to her infant an obligation which mothers of other days looked upon as sacred, she alone is responsible for whatever may follow in consequence.

Fashionable life makes such numerous demands upon the time and energies of its votaries, that, rather than give up their amusements, they prefer to place their children under the care of paid nurses; but let them consider that in so doing it is not unlikely they may lose a portion of their maternal love, or else fail to receive the entire affection of the child, for no ordinance of God can be violated with impunity.

The dangers which attend dry-nursing, or raising by hand, should be more generally appreciated by mothers. Many think it no sin to deprive an infant of the breast, while they deceive themselves by the false notion that by raising it on the bottle there will be a saving of trouble. Let them be taught the difficulties of adapting food to the wants of the infant when they step aside from Nature's laboratory, as well as the inevitable dangers which attend the experiment.

We have said that we believe it to be the duty of every mother to nurse her own child; but, as circumstances beyond control sometimes occur to deprive the infant of its natural food, we are then forced to provide nourishment for it; and here I believe it to be the imperative duty of parents residing in large cities to procure suitable wet-nurses, whenever it is within their means to do so. If this cannot be done, we must then look to art to furnish a substitute. I think it would require no labored argument to convince every intelligent person that it is to the milk of some animal we are to look for the best substitute. Milk, whether from the human subject or from the animal, is composed essentially of the same ingredients, the difference being only in their relative proportion. Providence has so beautifully provided for the wants of all creatures, that these ingredients are made to vary in the exact proportion to meet the wants of the young of each particular animal. It is evident, therefore, in providing a substitute for the mother's milk, that we should choose that which most nearly resembles it, or it should be made to do so by proper modification.

By referring to a table of analyses of milk, we see in asses' milk the closest resemblance; but as this can rarely be procured, cows' milk, on account of the facility with which it can always be obtained, is the one to which recourse is usually had. It is important, too, that the milk should be taken from a healthy cow, at liberty to feed and graze at pleasure, — not stall-fed, — and, if possible, always from the same animal; because,

as Dr. Dewees remarks, "different cows feeding upon the same materials often give different qualities of milk, and the stomach very generally becomes reconciled more easily to any one certain quality than to a mixture."

The milk of the cow, being intended to meet the wants of a strong and vigorous animal, cannot be rationally administered to a young and delicate infant, of much feebler digestive powers, without first undergoing some modification.

The difference between human milk and cows' milk, as ascertained by analysis, is as follows. Human milk contains — casein, 32, sugar, 36, butter, 29; cows' milk — casein, 63, sugar, 28, butter, 40. It will be seen from this that if cows' milk be reduced one-half, the casein will be about the same as in human milk, the butter slightly less, and the sugar only one-third of what it should be. In adapting it, therefore, to an infant, the first six or eight weeks it should be diluted with equal parts of water, have added a little sweet cream, and must be sweetened by adding to each six ounces of the mixture about one half-teaspoonful of sugar of milk, or lump sugar; the ordinary brown sugar should never be used, as it contains material which will more readily decompose and give rise to fermentation. After six or eight weeks the dilution need not be so great; one-third water will probably be sufficient. After three or four months the quantity of water may be still further reduced, — say one-fourth water to three-fourths milk. And after six months the milk may be given undiluted. During all this time the quantity of sugar and cream should remain the same. Any change in the dilution of the milk must be made with great care; for we must recollect that we can at the best but poorly imitate Nature in her increase of the casein in proportion to the growing wants of the child.

The rule which I have given will not apply to the milk which is served from door to door in large cities. Indeed, no rule will apply to such milk, for it is always of uncertain quality. Each case must determine for itself the degree of dilution, if any, and the mode of preparation.

The intervals of feeding should be regular, and the quantity given should also be carefully regulated. For the first two or three weeks, three or four fluid ounces every two or three hours will, generally speaking, be sufficient. As the child grows older, this quantity must be gradually increased. At this rate it will be seen that the child is getting in twenty-four hours at least a pint of pure cow's milk, — which ought to be sufficient, if properly digested, to meet its wants at this early age.

The mode of administering the milk is also important. It should always be given in imitation of Nature's way, — by sucking. A child will almost always instinctively suck from its earliest age. By this means it swallows the milk very gradually, and is, therefore, less apt to overload its stomach. The first show of indifference on its part is a sure sign that it has enough, and it should never be pressed to continue. When it has finished its meal, the bottle should be at once removed; for if permitted to suck at an empty bottle it will swallow air, which will give rise to colic-pains. If any milk remains in the bottle, it should be at once emptied out, and not kept for a subsequent feeding, as it is liable to undergo fermentation. The bottle and all parts connected with it should then be well cleansed, and placed in water until required again. If perfect cleanliness be not scrupulously observed, the bottle will soon smell sour, showing that some milk has been left to ferment. Fresh milk added while this remains will turn sour in a very short time. The sugar and water should not be added until the meal is required. The mixture should then be gradually raised to a temperature of 95 to 98 degrees. Should any tendency to acidity be observed in the milk, it should be rejected forthwith. No attempt at its supposed restoration should be made, by the addition of sugar or other agents, as these will eventually but increase the evil.

These precautions may seem minute, and, to some, unnecessary; but their importance cannot be overestimated. In proportion as they are deviated from, the risks to the child's life increase. They may also involve some little care on the part of the mother, whose duty it should be to supervise the preparation of the food; but she will be abundantly compensated for her trouble by securing what is most to be desired, — her child's life and health.

The farinaceous articles are highly improper as food for very young infants, for three reasons, — viz.:

1. Because of their inability to digest them. The conversion of starch into glucose, or grape-sugar, is begun by the saliva and completed by the intestinal juices. Now, the saliva is not secreted in the infant before the fourth month, nor does the intestinal juice of a very young infant seem to have the power of converting starch into grape-sugar, as would appear from the fact that in post-mortem examinations of children who during their lifetime had been largely fed on farinaceous articles, a starchy film has been found lining the intestines, which yielded the characteristic blue color to the iodine test.

2. They do not contain the four classes of food in the proportion required for healthy nutrition, — viz., albumen, fatty substances, carbo-hydrates, and salts; all of which are contained in milk, in the form of casein, butter, sugar and salts.

3. Supposing them to be digested, starches, and sugars into which starches are converted, have a greater affinity for oxygen than the albuminates have; they therefore tend to appropriate the oxygen which is required to combine with the waste tissues in order to effect their elimination, and they thus impede the proper nutritional changes; or, in other words, they are heat-giving rather than tissue-making materials.

While we regard the milk of an animal as the best substitute which can be furnished to a child in lieu of its mother's milk, it must not be forgotten that it can serve at the best only as a substitute, for it is not, and cannot be made, identical. It would seem, as every variety is composed of the same constituents, only varying in their relative proportions, to be an easy matter to balance these differences and thus make them identical. But it is not so. These constituents have different properties. Take, for instance, human milk and the milk of the cow. Examine their chief nutritive constituent, — casein. It will be found, if rennet be added to human milk, that its casein will coagulate into light loose clots, formed by the aggregation of little flocculi, which offer no impediment to the feeble digestive powers of the infant, on account of being the most easily digested of all known articles. On the other hand, add rennet to cow's milk, and its casein will coagulate into heavy compact lumps. The same thing takes place within the child's stomach, as may be seen by observing the milk vomited shortly after feeding. We have seen these lumps so large and tough as almost to choke the child when in the act of vomiting them, and have even found it necessary to assist in their removal from its mouth and fauces. They also may frequently be found in its passages, and even in a large and compact mass in its stomach after death.

This heavy, dense clot, then, of cow's milk, unlike the light, loose clot of human milk, is more difficult of digestion, and taxes the feeble digestive powers of the young infant to their utmost, which even then are often unequal to the task, permitting some of the casein to remain undigested, which, if not thrown off by vomiting, will speedily undergo fermentation and give rise to acidity and diarrhœa, and, if the error of diet be continued, may lead to more serious results.

It must be remembered that it is not that which is taken into the stomach that nourishes, but only that which is digested. Many a mother or nurse, ignorant of this fact, seeing that her child artificially fed does not grow properly, or, it may be, is losing its

plumpness, will, therefore, infer that something more solid is required. With this view she resorts to one or more of the many vile farinaceous compounds prepared and sold in shops under the name of "food for infants." But, alas for the poor victim of misdirected sympathies! this but adds distress to its discomfort, which, if the error of diet be not corrected, will continue to increase until some kind disease intervenes to relieve it of its suffering.

Rather let mothers and nurses be taught that digestion is essential to development, and that without it a child may actually starve on the fullest diet. The simple introduction into its alimentary canal of large quantities of farinaceous and caseous material is not necessarily followed by a corresponding increase of development. In all cases in which the food of an infant is said to be insufficient, the stools should be carefully examined, and if there be found in them the hard whitish or cheesy lumps, so characteristic of coagulated casein, it will be strong evidence that too much rather than too little is being given.

It is probably true that, in spite of all possible precaution, some infants will now and then be found with whom cow's milk will not agree. But before making any change, we should satisfy ourselves that it is the milk which is at fault, and not its mode of preparation.

Cow's milk may be rendered more digestible by the addition of some alkali; lime-water is perhaps preferable. As lime-water contains only about one-half of a grain of lime to the ounce of water, it may be largely used in the dilution of the milk. This will in a great measure prevent the formation of those firm coagula of casein so difficult for the infant to digest.

It may not be uninteresting to pass in review some of the inevitable evils which follow the administration of improper food to infants. Irritation of the digestive organs will necessarily follow. Vomiting is speedily excited and the food rejected. This hint which Nature gives is too often disregarded by those to whose charge they are committed. Food of the same kind is given again and again, and soon the stomach loses in a measure its excitability, permitting a part or the whole of it to pass through undigested. The intestines then become irritated, and, in their effort to get rid of these undigested matters, diarrhœa is excited. The evacuations are often horribly offensive, — due to the decomposition or putrefaction which these matters have undergone. Such an infant would necessarily be expected to lose both flesh and strength; for, besides the weakness resulting from imperfect nutrition, there is the additional cause of debility from the repeated attacks of vomiting and purging, until soon its digestive powers are rendered so feeble that it is less than ever able to obtain any nourishment from the diet with which it is furnished. A child thus erroneously fed often has a voracious appetite, which should be interpreted to mean that the ultimate structures of its economy are not satisfied. The quantity of food that it will sometimes swallow is enormous, and it is a matter of surprise to its attendants that, in spite of all this, wasting continues. It becomes peevish, fretful, and irritable; when awake, it will cry almost incessantly at times from hunger, and then again from abdominal pains; and, to add to its suffering, it is also frequently attacked with obstinate cutaneous eruptions. That affection of the mouth known as thrush is exceedingly common, and, when it occurs in an infant greatly reduced by a long course of improper feeding, betokens a condition of the digestive organs not at all favorable to the ready digestion and assimilation of food. If an infant of this description, with all power of endurance starved out of him, be overtaken by almost any acute disease, he will fall a ready victim to that which would be but a trivial ailment for a healthy child. Or if he escapes death from this cause, and continues to have supplied to him food which he cannot digest, the result will be the same, only a little longer deferred, as if all food were withheld. He will die of inan-

ition. Or, if able to digest only a part of what is furnished him, his life may linger on, extreme emaciation attends him, his face bears the expression of age, his belly grows large, tubercles may or may not become developed, and finally, skin and bones, he sinks and dies. A certificate is given of death from marasmus. Or, if the infant be injudiciously fed from his very birth, his miserable existence will be brought to a more speedy end, for such an infant rarely lives longer than three months. He will become so weakened by the vomiting and diarrhœa ensuing upon a bad state of nutrition as to be unable to make sufficient inspiratory effort to fill his lungs, and will die of sheer debility. Or, again, if he be overtaken by the warm weather of the summer season, cholera infantum will almost certainly end his existence.

It would be well were the evils of improper feeding confined alone to that class of unfortunate beings that are by necessity deprived of the breast.

Many an infant, with a full fountain of milk from which to draw its supply, is needlessly and wantonly stuffed with articles of food not only useless, but positively hurtful, through some mistaken notion or capricious longing for a fat baby on the part of its mother or nurse It is not uncommon to see children at six months, and at times even much younger, taken to the table with the family and fed upon a promiscuous diet. This is a fruitful cause of diarrhœa, convulsions, and a great variety of other diseases among children.

By way of conclusion I would add, that as small things portend the danger in the artificial feeding of infants, so do small things go far towards warding it off. A word of advice in time will have the effect of staying death from many a home.

—From an Article in Med. Times by W. M. Welch, M. D.

EDWARD JENNER, M.D.

The discoverer of vaccination. Born, May 17, 1749. Died, February, 1823.

EDWARD JENNER was the third son of the Vicar of Berkeley, in Gloucestershire, and was born on the 17th of May, 1749. The family was one of great antiquity in the county, and possessed considerable landed property.

Jenner received his early education in the school of Dr. Washbourn, at Cirencester, and early in life he showed a strong and growing predilection for inquiries in natural history. On making choice of medicine as his profession he was removed from school, and placed as an apprentice with Mr. Ludlow, a surgeon of great repute at Sudbury, near Bristól. At the age of twenty-one Jenner went to London, to pursue his studies under the care of John Hunter, in whose house he resided as a pupil during two years; and during this time a warm and lasting friendship sprung up between the master and his pupil—Hunter being much charmed by the industry and zeal displayed by Jenner, and by the excellence and delicacy with which he made some most valuable dissections. After his return to Berkeley, some years later, Jenner frequently corresponded with Hunter; and some of the letters, preserved in Dr. Baron's "Memoir," are full of lively interest on subjects of natural history and physiology. At Berkeley Jenner soon acquired a large practice; his surgical attainments, together with his very general information, and his amiable and polished manners, secured him a welcome reception from the most distinguished families in the district. His long country rides served to gratify his keen relish for the picturesque beauty in which the neighborhood abounded; and friends were often glad to accompany him twenty miles in his morning rides, eagerly listening to the overflowings of an enthusiastic admirer of nature and art.

The dress of Mr. Jenner, the Berkeley surgeon, is described as having been ususally a blue coat with yellow

buttons, buckskins, well polished jockey-boots, with handsome silver spurs, and his hair, after the fashion of the day, done up in a club, was surmounted by a broad-brimmed hat.

In 1788, Jenner married Miss Catharine Kingscote, a lady of elegant manners, accomplished mind, and vigorous understanding; in her council and sympathy he found support in many of the future trials of his life. About this time, too, he gained much distinction by papers on natural history, read before the Royal Society. Finding the fatigues of general practice becoming too laborious for him, Jenner resolved to confine himself now to the practice of medicine, and obtained, in 1792, from the University of St. Andrew's, the degree of M.D.

At the close of 1794, just as Jenner was on the eve of making his great discovery, he was attacked with typhus fever, and well nigh died of the disease; thanks, however, to the good hand of Providence, and the attentions of Dr. Parry, of Bath, Jenner was happily brought through his dangerous illness, and soon after his recovery we find him earnestly investigating the cow-pox, as it affected the human subject.

It happened that while Jenner was pursuing his professional education with Mr. Ludlow, of Sudbury, a young woman chanced to be in the surgery, and, hearing mention made of small-pox, she remarked that she could not take that disease, as she had already had the cow-pox. On inquiry, Jenner found it to be a popular notion in the district that those who had once had cow-pox were never attacked by small-pox. It appeared that, in Dorsetshire, a pustular eruption showing itself on the hands of those who milked cows, similarly diseased, had already attracted the attention of Sir George Baker; but he, at that time, was in the heat of controversy respecting the endemial colic of Devonshire, and did not pursue the subject.

Jenner, in one of his note-books, dated 1799, says that he can find no direct allusion to the cow-pox disease in any ancient writer, though the following, Jenner thought, bore some relation to it:—When the Duchess of Cleveland was taunted by her companions, Lady Mary Davis and others, that she might soon have to deplore the loss of that beauty which was then her boast, as virulent small-pox was raging in London, she made reply that she had had a disorder which would prevent her from even catching the small-pox.

THE SALE OF UNSOUND MEAT IN ANCIENT TIMES.

LEGISLATIVE enactments, forbidding the sale of unsound and unwholesome food, have been in operation from the earliest time. At first they were chiefly directed against the use of diseased and unsound meat. Among the Jews, for example, there has been a prohibition of this kind from the days of Moses, whose commandments concerning the slaughtering of animals for food, and the examination of their bodies for disease, are supposed to have been of divine origin, and have, therefore, been regarded with pious consideration; in fact, according to the Hebrew law, no flesh is fit for food, or shall be eaten, except it be of animals that have been killed and searched, or examined, by the officer (*bodek*) appointed for that purpose; and the most precise rules are laid down for his guidance in these matters—he being bound by very solemn obligations to declare of every animal that he kills, whether the flesh is proper to be eaten (*caser*), or is unfit for food, by reason of its being diseased or torn (*trefa*). The rules are traditional, for they are not found in the written law. They are, however, so severe as to cause the rejection of a very large proportion of the slaughtered animals; and hence it is customary for the *bodek* to make a bargain with the unorthodox butcher to take only those animals which he considers lawful, leaving the rest for

the food of the less particular Christian. I dare say this has been the practice at all times, for there is frequent reference to it in legal and domestic records: in *Liber Albus*, for example, there is a memorandum to the effect, that on the 24th of June, 1274, certain discreet men of the city were summoned before the king's council, to answer the question as to what was done with the unclean flesh of the Jews, and whether it was lawful for Christians to buy and eat the same? The answer was, "that if any citizen bought such flesh of a Jew he would be expelled, and if convicted by the sheriff, he would forfeit the meat, which would be given to lepers or dogs, and he, in addition, would be heavily fined." To which the council replied, that they commanded them in the king's name, to have the custom strictly observed. I fear, however, from the legal records of *Liber Albus*, that less attention was paid in those days to the sale of diseased meat than to that of putrid meat; for, on examining the accounts of the citizens made and rendered in divers courts of the king, I find that while "judgment of the pillory or the thew" is recorded in twenty-three cases for selling putrid meat, poultry, or fish, there is not a single instance of a like punishment for selling the unclean meat of the Jews. There is one account of a butcher who was paraded on horseback through the streets of the city, with his face to the horse's tail, for selling measly bacon at market, and the next day he was put in the pillory, with two great pieces of his measly bacon over his head, and a writing which set forth his crimes.

In ancient Rome there were overseers appointed to examine the meat in the public markets before it was sold, and butchers were often fined for neglecting the law in this respect. Mr. Charles Reed has given us an instance of this from the *Acta diurna*, or Roman Gazette, or 585 years after the building of Rome, which, when translated, runs thus: A. U. C. DLXXXV. Fourth of the Kalends of April. The fasces, with Licinius, the consul, and Lertinus, ædile, fined the butchers for selling meat which had not been inspected by the overseers of the market. The fine is to be employed towards building a chapel in the Temple of the goddess Tellus.

ADULTERATION OF FOOD.

As regards the definition of the subject, it is manifestly of prime importance that there should be a clear understanding of what is meant by adulteration; for although there are many practices which are regarded in some quarters as adulterations, yet as they are either called for by the public, or are concerned in an actual improvement of the article, they cannot, in my opinion, be said to be adulterations. As examples of this I would refer to the harmless mixture of flour with mustard, or chicory with coffee, of inferior starches with arrow-root, of gelatine with isinglass, of glucose with sugar-cane, of dripping or other fat with butter, of water with milk, vinegar, or spirituous liquors; for in all these cases the mixture is harmless, and is generally expressed by the price at which the article is sold — besides which it is the simple and almost natural result of that kind of competition in trade which the public encourage, and from which in the end the public derive advantage. What good reason, in fact, is there, why we should prevent the dealer from increasing the bulk of an article, or improving its appearance, or adding to its flavor, providing he does it without injury to the nutritive quality, the dietetical uses, or the wholesome nature of the substance. All that is required to guard against fraud in such cases is that the dealer should sell the article for what it really is, and should specify by means of a distinct label what the mixture is composed of, and the proportion of the several constituents. If he failed to do this, and sold a mixture of things for

a genuine article, he should be liable to a penalty for fraudulent dealing; and with these safeguards I would let the manufacturer employ whatever materials he likes to cheapen or improve his wares, provided always that the materials are harmless.

It must be otherwise, however, with the use of mineral, poisonous, or unwholesome compounds—the addition of alum to bread, of mineral pigments to confectionery, or indeed of any mineral substance to food, as well as the use of unsound or decayed articles of diet should be regarded as adulterations of a serious nature, and should be strictly prohibited.

In defining the term, therefore, I would limit its application to the use of unwholesome substances—permitting wholesome mixtures to be sold provided they are clearly designated at the time of the sale by means of a proper label, the absence of which should be evidence of fraud.

As regards the question of the adulteration of drugs, it appears to be beyond the scope of a local authority, and should be committed to some medical body whose knowledge of this difficult subject is sufficiently large to enable them to deal with it; for the question of the adulteration of a drug is not merely too difficult for an ordinary analyst to settle, but it is altogether a specialty which belongs to a competent tribunal. In many cases it would be impossible to declare whether an article was adulterated or not, seeing that its strength and peculiar action on the human body are often dependent on the age of the prepara-tian and on the climate where it is grown—this is so with almost every vegetable preparation, and notably with senna, rhubarb, opium, and sarsaparilla.

Popular Errors.—To think that the more a man eats the fatter and stronger he will become. To believe that the more hours children study the faster they will learn. To conclude that, if exercise is good, the more violent it is the more is done. To imagine that every hour taken from sleep is an hour gained. To act on the presumption that the smallest room in the house is large enough to sleep in. To argue that whatever remedy causes one to feel immediately better is good for the system without regard to more ulterior effects. To eat without an appetite, or to continue to eat after it has been satisfied, merely to gratify the taste. To eat a hearty supper for the pleasure experienced during the brief time it is passing down the throat, at the expense of a whole night of disturbed sleep, and a night of weary waking in the morning.

Microscopic Wonders.—Lewenboeck tells us of an insect seen with the microscope, of which twenty-seven million would only equal a mite. Insects of various kinds may be seen in the cavities of a grain of sand. Mould is a forest of beautiful trees, with the branches, leaves and fruit. Butterflies are fully feathered. Hairs are hollow tubes. The surface of our bodies is covered with scales like a fish; a single grain of sand would cover one hundred and fifty of these scales, and yet a scale covers five hundred pores. Through these narrow openings the sweat forces itself like water through a sieve. The mites make five hundred steps a second. Each drop of stagnant water contains a world of animated beings, swimming with as much liberty as whales in the sea. Each leaf has a colony of insects grazing on it, like cows on a meadow.

We learn from the *Grocer* that experiments recently carried on in India have proved that coffee pulp will yield, upon distillation, nine per cent. of its own weight of spirit, equal in strength to Scotch whiskey. Nothing is said as to the flavor of this spirit in its raw state; but it appears to realize on the spot a price nearly equivalent to one dollar per gallon.

Consulting the tables of Ulpianius, founded on the observations of one thousand years, we find that the mean term of Roman life was thirty years. At the commencement of the Christian era this was the average length of life.

SCIENCE IN WARFARE.

THE advances of civilized mankind in the art and science of wholesale human destruction, on which kings and governments spare no expense, seem gradually to be attaining their utmost degree of satisfactory completeness, as well as of endurable devastation. This latter circumstance does not yet appear to have occurred to crowned heads. Yet the wonder is, individual valor and prowess being now almost superseded, how long the old heroic dream of glory can endure after all the fair means of winning its fatal laurels are dashed to gory atoms and smoke, in most cases before a single blow of the hand has been delivered. That men can still be induced to face almost certain destruction, without the opportunity or chance of striking a blow, and probably with no successful result to their cause, as we have frequently seen of late, is one of those anomalies that must work its own cure before long. It appears as if we only now awaited the advent of some supreme professor of "natural magic," in order to make the earth crack and yawn beneath the feet of an armed host of enemies; that he should cause the air of this host to be poisoned till the breath of life was taken from them; or that another Franklin, but with a genius for killing people, should find means to collect and bring down the rain-clouds till men were drenched with water. This would be introducing a new element in warfare more numerically fatal in its effect than fire, if it could be used in a winter season, carrying with it all the crippling and paralyzing influences of cramps, agues, fevers, spasmodic pangs, bronchitis, sciatica, and dysentery.

We are arriving at a beautiful state of speculation, we highly-civilized, scientific homicides of Christian countries! Surely these depopulating and ruinous slaughters must work their own cure, and cease throughout the world, by causing a congress of nations to sit in judgment on all declarations of war by great military Powers. Whenever it comes to that, there will soon cease to be any need for the existence of the costly national curse of vast standing armies, or the systematic arrangement for their creation.

A thought, in a chemical and conquering sense, but superseding the need for slaughter, had once passed through the brain of a fictitious character named "Michael Salter," in a novel, which, being quite out of print, the writer thinks he may be pardoned for quoting. This character, not only accepting the world's cowardly and ungrateful sarcasms at all dreamers, visionaries, and enthusiasts (who have always been the "movers" of the world), but glorying in the thorn-crowned appellation, promulgates, among other ideas, the following — to wit, that when two hostile armies meet, the wiser general, instead of using murderous shot and shell, should overspread, envelope, and permeate the mass before him with a certain chemical vapor — a secret not very difficult to discover, yet not necessary to divulge — whereby the serried ranks of the enemy would in a few minutes be laid prostrate. In this condition all their arms and ammunition, not to speak of provisions and baggage, could be quietly taken from them. They would recover after a short time, and then terms could be dictated by the conquerors just as well as if they had covered the field with dead and wounded — in fact better, in several respects. All this seems rather ridiculous to our present view of blood-reeking fields; in fact, almost ludicrous, like the idea of "putting a girdle round about the earth in forty minutes," which is now very nearly accomplished.

ANCIENT SIGNALS AND EXPRESSES.

THE great desire of the present age seems to be for speed. The world clings most fondly to the proverb that "time is money"; and considering how much varied experience can be compressed into a few years by the greater rapidity of movement that the costly undertakings we see around us place at our command, we might almost reverse the proposition, however illogically, and say that "money is time!" Distance, nowadays, counts for nothing. A train only goes twenty-five miles in an hour, and we call it slow; a racing-boat is propelled by its crew upwards of four miles in twenty-five minutes, and the "time" is pronounced to be "bad;" or, again, a man complains that he has been "almost a whole month" coming from India — a matter of some seven thousand miles.

But the most telling phase of this quickness of communication is, of course, the immense development of our telegraphic system. The successful laying of the Atlantic Cable was the signal for schemes of ocean-telegraph lines everywhere; such an increase as will perhaps attend the taking up of the telegraphs by the General Post-office. Already there are three lines at work between Europe and America; and the Exchange and the Bourse on one side, and Wall Street on the other, are not satisfied save with the news of the last few hours from the opposite continent. Not long ago the newspapers were full of grumbling at the tardy arrival of news from Bombay or Kurrachee, when a *few hours* (save the mark!) might have sufficed; and now we have contrived to beat the sun.

But if our almost universal "express messenger" at the present time is the telegraphic wire — a quite recent innovation — it may be a matter of interest to inquire how men of old fared in this matter — not our own forefathers, but those who lived and struggled, and thought, and toiled, in those bright classic days which possess for us so mighty a charm, holding up the mirror to us, that we may behold our own lives "writ small," so to say. We have but a few scanty notices on this point of ancient telegraphs and signals; but by comparing them together, it may be a clearer idea will perhaps be gained.

Fire would naturally suggest itself as the earliest and most ready mode of signalling, as the eye is so easily attracted by light. This, of course, would be most effectual during the night, though a thick smoke would show on a clear day at a considerable distance. Accordingly, as far back as old Homer, we find Sinon represented as signalling to the Greek fleet to return from Tenedos, now that the stratagem of the "wooden horse" was successful, by lighting fires on the shore. Æschylus, in his *Agamemnon*, describes, by the mouth of Clytemnestra, how the long-looked-for capture of Troy was made known at Mycenæ. From point to point the glare of the beacon-flame spreads its news — from Ida to Lemnos, Athos, Macistus, Messapium; from the dun heights of Cithæron to Ægiplanctus, which passes on its tale of victory across the Saronic Gulf to Arachnæus, a hill in the hero's home-territory; and the weary sentries of Mycenæ hail with joy the downfall of their foe, and wait their liege lord's speedy return. This passage will recall to the memory the famous parallel, if not imitation, by Macaulay, in his *Lay of the Spanish Armada*, where the bale-fires rouse England, from Plymouth to Carlisle, for defence against the foe.

Later on, in more historical times than those of Troy, Mardonius, the Persian commander left in Greece by Xerxes, is represented as prepared to telegraph the capture of Athens to his master at Sardis, by similar means. But, at the time of the Persian war, fire-signals had been brought to a considerable degree of accuracy. Herodotus tells us that as the Greek fleet lay at Artemisium, waiting for the Persians, it became known to them by fire-

signals that their three look-out ships had been captured by the enemy, though, whether they learned in the same way that the crews had made their escape, is not quite clear from the passage.

The daring menace of Brasidas, in the early part of the Peloponnesian War, on the harbor of Piræus, was telegraphed to Athens by fire-signals.

This elaborate use of fire-signals at sea was fully equalled by the information that could be thus conveyed in land operations. The well-known description of the escape of the Platæan garrison is a proof of this. It would appear that the daring party who made the sally owed their safety, in some measure, to the *advance* which had been made in the art of fire-signalling; for the besiegers, finding that their enemies had passed the wall of circumvallation, signalled to Thebes an attack; but the Platæans left in the town had foreseen this, and had prepared a number of counter-signals, to create confusion, and render the Peloponnesian signals indistinct, so as to favor the escape of their comrades.

These are some of the most striking instances of the use of fire-signals among the ancients. Perhaps we may add to them a notice which Cicero gives of the approach of freebooters being marked by raising a fire on some conspicuous place.

Fire-signals were thus, as we see, used considerably *at night;* but how information was as rapidly and accurately conveyed by day, is not very clear. There are, however, one or two somewhat notable instances. Herodotus tells us that, after the failure of the Persians at Marathon, a party in Athens, suspected to be the Alcmæonids, who wished for the restoration of Hippias, held up a bright shield as a signal to the Persians that they should sail round Cape Sunium, and make a sudden attack on the city, while the army was still absent.

The shield was apparently well known as the signal for attack. The admiral's ship in a fleet showed a shield at the stern as a signal for battle. Among the Romans, however, a red flag flying over the consul's tent served this purpose. It is by no means unlikely that the ancients made far more use of the human voice for conveying information than we are in the habit of doing. The soft air of the south of Europe disposes the inhabitants to much more frequent and powerful use of the lungs in speaking than is usual in the cold and bleak north. Greek statesmen were in the habit of addressing large crowds out of doors, in the *Agora*, or the theatre; and the profession of a herald required the continual practice of a naturally clear and commanding voice. Thus nature seemed to combine with art for the purpose; and it is a curious fact, that in Albania, at the present day, the natives are wont to pass messages from hill to hill of their rocky and echoing country by a peculiar intonation of the voice; so that places many miles distant are thus brought within a few minutes' communication with each other. This phenomenon of mountain districts has been remarked by Sir Walter Scott in *Anne of Geierstein*: "The voice, again, called to him with the singular shrill modulation of the mountain halloo, by which the natives of the Alps can hold conference with each other from one mountain ridge to another across ravines of great depth and width."

Another well-known means of sending news rapidly, in a country with such bad roads as Greece, was by *trained runners.* Thus we are told that Phidippides, a professional courier, ran from Athens to Sparta, to beg for aid, just before Marathon; arriving at the latter city at the end of the second day; and this was a distance of one hundred and fifty miles. The constant gymnastic training in which Greek, and especially Spartan, soldiers kept themselves, enabled whole armies to make very rapid forced marches. In countries more favorable for speedy travelling, much use was made of horses and other animals. The admirable system of roads and posts instituted by the kings of Persia throughout their vast dominions — "the posts that rode upon mules and camels," as

we have it in the Book of Esther, excited the wonder of Herodotus, who says emphatically that "there is nothing in the world swifter than these messengers!" At the present time, an Arab will not unfrequently travel a hundred miles in a day on one of their untiring horses.

The Romans, with their straight roads, the primary object of which (as of Russian railways) was speed for military purposes, provided, we may be sure, the means for making the utmost of them. In the times of the Empire, post-houses were set up along the great highways every five or six miles, with about forty horses at each; so that a Roman ambassador, for instance, using these relays, might easily journey in his chariot a hundred miles a day.

Occasionally, ships were sent as express messengers; the *Salaminian* and the *Paralus* were used for this service at Athens.

SHIPWRECKS.

It is a curious fact that vessels are not lost on account of their age, the proportion of losses being shown to be on the side of the "comparatively new vessels," but because they are not seaworthy from various causes, are deficient of "hands," and so badly "found."

But there is something else worthy of notice and remonstrance. The physical world, as well as the moral and political world, is undergoing changes in different parts of the earth. England, for instance, is not generally so cold in winter as it was fifty years ago; and the colony of Victoria, in Australia, is by no means so hot in summer as it was twenty years ago. The surface of our globe is changing in many places, both on land and sea; rocks and islets sink here, rise there; and many quicksands as well as ocean-rocks, whose positions were once known and recorded, have shifted their fatal presence, in some cases almost abruptly, in others imperceptibly. And we now come to one of the causes of shipwreck which has never been duly considered. The chief and regular nautical books of our merchant navy are substantially what they were thirty or forty years ago. New editions from time to time issue from the press, but they are written with the scissors, and have few revisions beyond those necessary to mark the dates of reissue. A similar remark may be made with regard to the charts in common use by the whole of our merchant vessels. Now suppose any old and well-experienced captain in the merchant service, or carrying trade, and one who had proved himself a trustworthy navigator for years,—suppose such a man were to "loose his fore-jib" for an attack on this continual reissue of old nautical books as new editions, revised and corrected, etc., declaring that they were full of dangerous errors of commission and omission, what would be the consequence? All the best pens, as well as scissors, of the "vested interests" would instantly be put in motion, to prove, by elaborately confusing figures and irrelative or insignificant facts, that the reissues of nautical books were as correct as possible up to the present time, and, indeed, were guardian angels of the merchantmen of the whole navigable globe. And the same, with equal confidence, might be said of the charts. No new observations, soundings, or calculations were required in either. Pay your money, and hold your tongue. If your ship is lost, there's the "insurance" ready to heal your owner's wounds, and the sea has buried her dead.

A PHYSICIAN writes asking a renewal of a note which he owes, giving as a reason therefor: "We are in a horrible crisis; there is not a sick man in the district."

FIRES.

WITH regard to fires in general, and more especially when occurring in private houses, the late Mr. Braidwood, formerly captain of the London Fire Brigade, assured the writer that the great majority of fires need not do any mischief beyond the room, or part of the room, in which they first break out, if the inmates did not instantly lose all presence of mind. Instead of attacking the fire at once and smothering the flames with water, rugs or blankets, door mats, etc., the first thing they always do is to rush out of the room, leaving the door open behind them, which causes a draught. In very many cases they throw open a window to cry "Fire!" and then rush away, leaving both window and door open; and this through draught makes the increase of the flames certain. Mr. Braidwood considered that if there were no particularly combustible articles in a room, and the inmates retreated, after carefully closing all windows and doors, the fire would in most of the ordinary cases die out of itself. What is continually said about a "spark" dropping is great nonsense. It is not at all easy to set fire to a house, without first lighting curtains or other immediately inflammable articles. A sporting gentleman — one of the amateur attendants at great fires— offered once to lay a bet that he would empty the whole of a good winter fire in a drawing-room out of the grate, and place it upon the carpet in the centre of the room — all the company being seated in a large circle; — and not only the house, but the drawing-room should not take fire. Mr. Braidwood said he would have backed such a bet. In all probability there would only have been a large hole burnt in the carpet, and another of much less size in the floor, so that very little of the fire would fall through upon the centre of the carpet or dining-room table below.

Now, the active principle in all fire is flame. The red heat is a subsequent and almost fatal condition; it is clear, therefore, that something should always be done at once to destroy the travelling and communicating principle, viz., flames. For this purpose the agent invariably applied is water, both on account of its antagonistic elementary nature, and also its weight. It strikes blows as well as pours torrents.

WHAT BECOMES OF CARBONIC ACID?

ANIMAL life, and fire, diminish the amount of oxygen in the atmosphere, while increasing the amount of carbonic acid. Hence, in the lapse of time, the present conditions for life would greatly change.

This is the more apparent, since air containing as much as one per cent. of carbonic acid acts already deleterious on the human system. But as animal life has existed for ages on the globe without producing any dangerous accumulation of carbonic acid in the air, there must exist a cause continually diminishing the amount of this gas in the air.

Vegetable life is this cause. Plants absorb carbonic acid from the air, build their substance mainly from the carbon contained therein, and give up a great part of the oxygen to the atmosphere. This is proved by the following facts:

1. Plants cannot grow in air completely deprived of carbonic acid, for, brought into such an artificially prepared atmosphere, they die.

2. When a small, living branch with leaves is brought into a glass vessel containing atmospheric air, the amount of carbonic acid in the latter diminishes, while the amount of oxygen increases, provided the plant be exposed to the sunlight.

Besides the carbonic acid, plants take also water from the air, and part

of the latter is found to combine with the carbon resulting from the former. The principal parts of plants, such as woody fibre, etc., is indeed composed of carbon, hydrogen, and oxygen, the latter two in such proportions as to be equivalent to carbon and water. Hence they are termed *carbohydrates*.

Decaying animal matter exerts a favorable influence on the growth of plants, constituting a ready source of nitrogen to the same.

Finally, from the soil wherein the plant has its root, the plant obtains those mineral matters which constitute the ashes of the plant when burnt.

The chemical life of plants thus appears to consist mainly in the decomposition of the carbonic acid taken from the atmosphere. The carbon is accumulated in the body of the plant, while the oxygen is returned to the air. But since carbonic acid results from carbon and oxygen under production of a great amount of heat, heat must be applied to it to separate the carbon from the oxygen. The life of plants, therefore, requires the expenditure of a great amount of heat or power to reduce the compound to carbon and free oxygen. This expenditure of heat is met by the sun's rays. Hence it is that plants grow only in the sunshine.

Since animals cannot live without plants, and since the plants require the power of the sunbeam in order to separate the oxygen from the carbon, we see that the sunbeam is the true source of all physical life upon the earth.

Since, finally, the muscular power and the heat of animals are due to the combustion of carbon and oxygen, both furnished them by the sun's action on the plant, the life of animals, both in regard to heat and power, is a direct effect of the sunbeam, being neither more nor less in amount, only changed in form. — *Scientific Monthly.*

"NOTHING NEW UNDER THE SUN."

As for the old saying that there is "nothing new under the sun," it is no doubt true of most things in principle, and to a certain degree in practice; but it is not true in the full sense of the expression. Surely the discovery, or invention, of gun-cotton is new; the whole system of telegraphy, by land and sea, is new; the sewing machine is new; Daguerre, Fox Talbot, Niepce, and Claudet may have been unwittingly defrauded of their due honor, by the scientific substitute of the general term "photography," instead of combining men's names with their wonderful discoveries, — nevertheless, the sun-pictures and portraits really are new things "under the sun." So, among other beneficent novelties of our age, we must assuredly rank the humane discovery of the use of chloroform and ether in surgical operations, and other cases of human suffering. Would it not also be a new thing under the sun of our vaunted civilization to suggest that, so long as capital punishments are allowed to exist on the legal codes of nations, some means of painless extinction should be adopted? Wherefore not? Is a dog's cord the only sure means of producing asphyxia? Cannot a criminal's death be as certainly and suddenly effected with his head upon his shoulders as if it were thrown into a basket? It is of course admitted that the object of a penal code is not that of revenge, but to prevent an individual from again committing a special act of violence, or other wrong, towards society; and also that the "example" of his judicial death should deter others from similar offences.

A Late writer says that he has seen a steam boiler advertised which saves 33 per cent. of fuel; a valve which saves 15 per cent.; a governor which saves 10 per cent.; a cut-off which saves 10 per cent.; a fire grate which saves 20 per cent.; metal packing and damper regulator which saves 12 per cent.; and a lubricator which will save 1 per cent.—making in all a saving of 101 per cent.

Nature's Economy.— "Let us suppose that one of the stupid, salamander-like labyrinthodonts, which pottered, with much belly and little leg, like Falstaff in his old age, among the coal forests, could have had thinking-power enough in his small brain to reflect on the showers of spores which kept on falling through years and centuries, of which perhaps not one in ten million fulfilled its apparent purpose and reproduced the organism which gave it birth: surely he might have been excused for moralizing upon the thoughtless and wanton extravagance which Nature displayed in her operations. But we have the advantage over our shovel-headed predecessor,— or possibly ancestor,— and can perceive that a certain vein of thrift runs through this apparent prodigality. Nature is never in a hurry, and seems to have had always before her eyes the adage, 'Keep a thing long enough, and you will find a use for it.' She has kept her beds of coal many millions of years without being able to find much use for them; she has sent them down beneath the sea, and the sea-beasts could make nothing of them; she has raised them up into dry land, and laid the black veins bare, and still, for ages and ages, there was no living thing on the face of the earth that could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her workshop, who, by degrees, acquired sufficient wits to make a fire, and then to discover that the black rock would burn."

* * * * * *

"All this abundant wealth of money and of vivid life is Nature's interest upon her investment in club-mosses and the like, so long ago. But what becomes of the coal which is burnt in yielding this interest? Heat comes out of it; light comes out of it; and if we could gather together all that goes up the chimney and all that remains in the grate of a thoroughly-burnt coal-fire, we should find ourselves in possession of a quantity of carbonic acid, water, ammonia, and mineral matters exactly equal in weight to the coal. But these are the very matters with which Nature supplied the club-mosses which made the coal. She is paid back principal and interest at the same time; and she straightway invests the carbonic acid, the water, and the ammonia in new forms of life, feeding with them the plants that now live. Thrifty Nature! Surely no prodigal, but most notable of housekeepers!" — *Prof. Huxley*.

Politeness.— Perhaps the highest compliment, all things considered, which we can pay to Hugh Miller was this — that he was in the best sense a gentleman, that he was truly and strictly polite. True politeness is one of the rarest things; it may be met with in the hut of the Arab, in the courtyard of the Turk, in the cottage of the Irishman; and it is excessively scarce in ball-rooms. It is independent of accent and of form; it is one of the constant and universal noble attributes of man, wherever and howsoever developed. We venture to define it thus: — Politeness is natural, genial, manly deference, with delicacy in dealing with the feelings of others, and without hypocrisy, sycophancy, or obtrusion. We cannot agree that Johnson was polite, that is, if politeness is to be distinguished from nobleness, courage, and even kindness of heart. Burns was polite, when jewelled duchesses were charmed with his ways; Arnold was polite, when a poor woman declared that he treated her like a lady; Chalmers was polite, when every old woman in Morningside was elated and delighted with his courteous salute. But Johnson, who shut a civil man's mouth with "Sir, I perceive you are a vile Whig," who ate like an Esquimaux, who deferred so far to his friends that they dared to differ with him only in a round-robin, was not polite. Politeness is the last touch, the finishing perfection of a noble character. It is the gold on the spire, the sunlight in the corn-field, the smile on the lip of the noble knight lowering his sword-point to his ladye-love. It results only from the truest balance and harmony of soul.

INDIAN papers give two native theories of the causes and origin of earthquakes. The one is, that when the world becomes sinful, a kind of large serpent, on which the world rests, turns on its side, and so causes them. The other is, that earthquakes are caused by periodical leaps of the mountain gods, from one mountain to another.

A FRENCH journal says, that a society has been formed in Paris, now numbering more than a hundred members, each of whom declare that it is his wish that his body, after death, be used for the promotion of anatomical science.

THE POINT of the following anecdote might apply as well to the new German Emperor as it undoubtedly did to his ancestor. Dr. Baylis was an English physician of great repute in the middle of the last century. His skill obtained for him the post of physician to the then King of Prussia. On his first introduction, the King is said to have observed to the doctor, that to have acquired so much experience, he must necessarily have killed a great many people. To which the doctor replied, "Pas tant que votre Majeste"—"Not so many as your Majesty."

MEASURED by man's desires he cannot live long enough; measured by his good deeds, he has not lived long enough; measured by his evil deeds, he has lived too long.

THEODORE PARKER compares some men who grow rich by trade to cabbages growing in a violet bed. They smother the violets, but are, after all, nothing but cabbages.

BED is a bundle of paradoxes: we go to it with reluctance, yet we quit it with regret; and we make up our minds every night to leave it early, but we make up our bodies every morning to keep it late.

THE muscles of the human jaw exert a force of 534 pounds. The quantity of pure water which blood contains in its natural state is very great; amounts to almost seven-eighths. Kiel estimates the surface of the lungs at 150 square feet, and the blood is one-fifth the weight of the body. A man is taller in the morning than at night to the extent of half an inch or more, owing to the relaxation of the cartilages. There is iron enough in the blood of forty-two men to make a plowshare. The human brain is the twenty-eighth part of the body, but in the horse the brain is not more than the four-hundredth. — *Nat. Med. Jour.*

THERE is a certain quack who has added to the list of his discoveries a safe and certain cure for all who have asthma, *excepting those who have a cough.*

REALITIES.—A person being asked what was meant by the "realities of life," answered, "Real estate, real money, and a real good dinner, none of which could be realized without real hard work."

SOME one says the best way to train up a child in the way it should go is for the person to travel that way occasionally himself.

A MAN who sat upon a paper of carpet nails said they reminded him of the income tax.

"TEETH extracted with great pains" is the advertisement of a Washington dentist.

IN Queen Anne's reign no physician, with the slightest pretensions to practice, could manage without his chariot and four, sometimes even six horses.

A NOBLE man is he who can die patiently, but still nobler is he who can live patiently.

LIFE'S LESSONS.

SPRING, with balmy showers,
Brings the early flowers;
New-born beauty gleams
'Neath the sunny beams.

Summer glorious pours
Forth the richest stores;
Freshest fragance sends
Trees with fruitage bends.

Winter, shivering cold,
Dims the green and gold;
Blasts with frosted breath,
Buries all in death.

Childhood, light and gay,
Sports amid its toys,
All the gladdening way
Strews, with hopes and joys.

Youth's maturest powers
Bring life's brightest days,
Crown with happiest dowers,
Riches, pleasures, praise.

Old age, with its fear,
Loses all life gave;
Feeble, lone, and drear,
Hastens to the grave.

Pass then shall all pain,
Death from death shall sever;
Bloom shall life again,
For ever and for ever.

REV. CHARLES NAISMITH.

"The Man of Wisdom is the Man of Years."

GOOD HEALTH

A JOURNAL OF

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To the Members of the American Medical Association.

GENTLEMEN:

The accompanying specimen number of GOOD HEALTH has been sent for your inspection at my request. Having accepted the position of *Medical* Editor for the ensuing year, I assume the responsibility and management of this department for the third volume of this MONTHLY — the first number of which (the June), containing my first editorial, will be sent you. As you will perceive, this Journal is intended as an organ through which the profession may reach the more intelligent part of the community, and by which the latter may learn to distinguish between charlatanism and science;— and since it *warmly defends* and labors for the interests of the profession, it should receive the largest and most cordial support possible. This can be accomplished by a little effort in introducing it to the public, or by contributing to its pages. Whatever our position or personal interest, it must be admitted that the medical profession of this country has not that high representative character which it should possess: and that neither the medical world of Europe, nor the *public* here, have that respect for it which it should command. The disgrace suffered by the delegation to the International Convention in Paris, and the impudent and insolent attitude of the most ignorant empyrics here (see last Report of the American Institute of Homœopathy, Halsey, Chicago, 1870), are facts which illustrate most fully and painfully this truth. It must become the object and the duty of every member of so eminent a profession to contribute his full share towards remedying an evil of such magnitude. This I conceive can only be accomplished by subordinating the personal to the general interest. We readily admit that a certain degree of exclusiveness, as in private societies and cliques, are of benefit in many respects; but, if carried too far, do great harm in dividing the centres, thereby giving to charlatanism an opportunity to reap a rich harvest. As an individual. I shall do my best in the direction indicated, and with this object in view have voluntarily and gratuitously accepted the position. I am well satisfied that if each member of the profession, who has the ability, would devote but one hour a week towards the object of educating the public in scientific medicine. the result would be, that, in one year's time, a charlatan of any kind would find it hard work to compete, even in outward appearances. with professional men. Were I not convinced of this, I should have quitted the ranks long since.

I have thus addressed you, to call attention to what is deemed an important object — the medical education of the public through a monthly journal — the perusal of the first two volumes of which will most fully demonstrate its purpose and manner of teaching. It seems to me that if the *profession* of America cannot countenance and give their support to at least one organ of reliable instruction for the public. it has little claim either for respect or for existence.

Any contribution to GOOD HEALTH of a scientific character shall have my most respectful attention, and, if rejected, the reasons therefor invariably given to the author. Contributions of a suitable character, by or with the endorsement and recommendation of already *known* scientific and literary members of the profession, will be at once accepted.

Thus hoping to succeed in presenting a journal that will be an honor to the profession and a source of authoritative instruction to the public, I have the honor to be,

Your most obedient servant,

DR. CARL BOTH.

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TO EDITORS.—As we can only know the wishes of those to whom we send our MAGAZINE through their own expression of them, we shall hereafter take it for granted that all those from whom NO RESPONSE is received do not care to receive it, and will therefore be dropped from our Exchange List.

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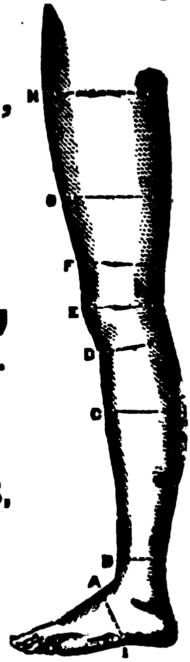

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For Stocking to reach to G, measure at A B C E G, and from I to G.

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